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DISEASES CAUSED BY BACTERIA AND FUNGI.

BANG, B. (1932). Ueber die Bedeutung der Entdeckung des Tuberkelbazillus für die Bekämpfung der Haustiertuberkulose. [**The Importance of the Discovery of the Bacillus of Tuberculosis in the Control of Tuberculosis in Domestic Animals**].—*Zschr. Tuberk.* **64.** 87-99.

One of a series of articles contributed to a special number of the journal to celebrate the 50th anniversary of KOCH's publication of his discovery before the Berlin Physiological Society on the 24th March, 1882.

Bang describes his experiences in Denmark in the use of tuberculin for the elimination of tuberculosis from infected herds. The great majority of reacting but clinically healthy cows bear healthy calves and these will remain healthy if they are protected from infection. They must therefore be removed as soon as possible from the infected shed and fed on tuberculosis-free milk. In this way a new healthy herd can be bred from an old infected one. In conclusion he described the use of this method in the eradication of tuberculosis in the United States of America [Bang's method of eradication].—F. BULLOCK.

—. (1932). **Report of a Special Committee appointed by the People's League of Health Inc. to make a Survey of Tuberculosis of Bovine Origin in Great Britain.** pp. xvii + 44. 22 tables. [12 refs.] London : The People's League of Health. [8vo.] [1s. 6d.]

This report summarizes the findings of an influential committee of 65, of whom, however, only seven were veterinarians, appointed by the People's League of Health. The terms of reference were wide, but the enquiry chiefly concerned the transmission of bovine tuberculosis to man through the medium of cow's milk and what steps ought to be advocated for its prevention. Two sub-committees were formed, each of which dealt with certain aspects of the enquiry. The incidence of tuberculosis in cattle was carefully investigated, especially as to the number of cows giving tuberculous milk, information being obtained from very varied sources, such as agriculturists, medical officers, veterinarians and others.

In conclusion, the committee find that about 40 per cent. of dairy cows are infected, while about 0·2 per cent. of all cows excrete living tubercle bacilli in their milk and roughly 6·7 per cent. of ordinary market milk contains tubercle bacilli. Of all deaths from tuberculosis in England and Wales 6 per cent. are caused by the bovine type, or about 2,000 persons, chiefly children, succumb annually, although at least 4,000 fresh cases occur each year.

After discussing the means of prevention, the committee fall back on pasteurization of all milk not produced by guaranteed tuberculosis-free herds as the most practical measure at the present time. It recognizes that this is not immediately possible as a general measure and recommends that permissive powers should be given to the larger urban areas to require the efficient pasteurization (or other accepted form of heat treatment) of all milk sold within their area which is not drawn from tuberculosis-free cows.—D. S. RABAGLIATI.

I. GAIGER, S. H. (1932). **Bovine Tuberculosis and its Relation to the Disease in Man.**—*J. Min. Agric. London.* **39.** 17-23.

II. MYERS, J. A. (1932). **Tuberculosis in Animals and Man.**—*J. Amer. Vet. Med. Ass.* **80.** 914-920.

I. The author discusses the relationship of the disease in bovines and in children. He states that there are figures which show that approximately 10 per cent. of our farms are producing tuberculous milk. It has been estimated that, in children in England under five years of age, 33 per cent. of the cases of tuberculosis are due to infection from cow's milk and, of cases of this disease in children between the ages of five and ten, 24 per cent. are caused by the bovine tubercle bacillus. In Scotland, in cases in children under five years of age, roughly 80 to 90 per cent. are caused by the bovine tubercle bacillus.

He states that there is nothing to show that the incidence of bovine tuberculosis is on the decrease due to the working of the Tuberculosis Order. The author quotes the scheme put forward by the National Veterinary Medical Association for the establishment of tuberculosis-free herds in suitable parts of the country, the object being the eventual establishment of tuberculosis-free areas which shall be of ever widening extent. Sooner or later an eradication scheme will have to be commenced and no good purpose is served by delay.

II. The author speaks of childhood and adult types of tuberculosis. He states that the childhood type is not destructive generally speaking, but prepares the way for the destructive adult type. This adult type may appear at any period of life, but must always be preceded by the childhood type. Pasteurization of milk has reduced the incidence of the disease in children in New York City from 64 per cent. to 16 per cent., but pasteurization is not always well done and therefore the only satisfactory method is to strike at the disease in the cattle by the slaughter of all animals reacting to the tuberculin test.—NORMAN DOBSON.

MÜLLER, B. (1932). Dünndarmtuberkulose beim Schwein. **[Tuberculosis of the Small Intestine in the Pig].**—*Berl. tierärztl. Wschr.* **48.** 527-528. [4 refs.]

The author describes as a great rarity a case of tuberculosis of the small intestine of a pig killed for food purposes. In addition there were numerous lesions elsewhere in the body.—J. E.

MINETT, F. C. (1932). **Avian Tuberculosis in Cattle in Great Britain.**—*J. Comp. Path. & Therap.* **45.** 317-330. 1 table. [12 refs.]

The natural occurrence of avian tuberculosis in cattle in Great Britain is reported. The nature of the infection was established in three calves and in two adult bovines belonging to three herds, but it was probable that other cases among calves existed in at least one of these herds. Tuberculosis was proved to exist among fowls which had free access to two of the herds.

In four instances the organisms were isolated from glands of the alimentary tract and in the fifth instance from the apparently normal intestinal mucous

membrane.

Four of the five cases were detected as a result of reactions to the intradermal johnin test but, where tests were made, the animals reacted still more strongly to avian tuberculin and in a smaller degree to mammalian tuberculin. *Post-mortem* examination, however, failed in all cases to show the presence of bovine tuberculosis or Johne's disease. With two animals strong reactions to avian tuberculin or johnin could be elicited for a period of six months after removal from the source of infection, but at the time of slaughter one of these had apparently overcome the infection.

The strains of avian tubercle bacilli from the calves were highly virulent for rabbits and fowls ; those from two adult cattle were of low virulence, probably owing to a more prolonged residence in mammalian tissues.

The practical importance of avian tuberculosis in cattle is discussed.

—F. C. Minett.

Reed, G. B., & Gardiner, B. G. (1932). **Studies in the Variability of Tubercle Bacilli. V. Acid Agglutination and Electrophoretic Potential in** *Mycob. leprae*.—*Canad. J. Res.* **6.** 622-631. 1 fig., 7 tables. [16 refs.]

S and R types of *Mycobacterium leprae*, suspended in distilled water, were examined for differences in electrophoretic potential, iso-electric point and acid agglutination. A difference of electrophoretic potential was observed between the two types of approximately five times the probable error of the determinations. The iso-electric points of S and R suspensions were respectively pH 1·2 and pH 2·2. Acid agglutination was found to occur at widely different pH levels, nevertheless the agglutination occurred at approximately the same electrophoretic potential—at about 18·2 millivolts—for both S and R types.—W. R. Wooldridge.

I. —. (1931). **Calmette and Others on B.C.G.**—*Lancet.* **221.** 1151-1152.
II. Cummins, S. L. (1932). **BCG Vaccine.**—*Ibid.* **222.** 422.
III. Calmette, A. (1932). **BCG Vaccine.**—*Ibid.* 643.

I. This note deals with the second International Congress on Comparative Pathology held in October, 1931, at Paris. Calmette referred to the claims made by certain workers that they had been able to restore some, at least, of the original virulence to BCG by cultivating it under special conditions. He believed those claims to be based on errors or misconceptions and in his opinion no one had yet succeeded in turning the BCG into a virulent strain. He argued in favour of the general principle of immunization with live cultures as opposed to dead cultures, which confer only a brief and uncertain protection.

II. Cummins pays a tribute to the faith and courage of Calmette in using BCG vaccine on children, and to his energy and organizing abilities which have facilitated the production, standardization and distribution of the vaccine on a large scale. Cummins used BCG vaccine on about a dozen children, born in tuberculous surroundings, without untoward result. He is opposed to its wholesale application, but considers that it might be profitably employed for the inoculation of children in infected families.

III. This is a letter from Calmette in which he approves of the remarks of Cummins regarding BCG. Calmette states that, as the result of 30 years study of tuberculosis, he is of the opinion that dead antigens, bacilli or bacillary products confer no immunity. He says :—" How is it possible for a reasonable person not to understand that it is better to immunise children immediately after birth against tuberculosis by the impregnation of their organism with surely innocuous and permanently effective bacilli, than to wait for them to be immunized by an

accidental virulent infection which may turn into a deadly illness any day of their lives ? "—T. M. Doyle.

I. Ascoli, A. (1931). Ce que nous ont appris six années d'application pratique du BCG. [**Six Years' Experience of BCG Vaccine**].—*Ann. Inst. Pasteur.* **47.** 29-31.

II. Parisot, J., & Saleur. (1931). Cinq années de vaccination antituberculeuse par le BCG en Meurthe-et-Moselle. [**The Results of Five Years' Vaccination with BCG in Meurthe-et-Moselle**].—*Ibid.* 32-38. 1 table.

III. Sergent, E., & Ducros-Rougebief, H. (1931). Vaccination prémunitive antituberculeuse en Algérie par le BCG durant l'année 1930. [**Vaccination with BCG in Algiers during 1930**].—*Ibid.* 144-146.

IV. Pasteur Institute. (1931). Documents pour servir à l'étude de la vaccination préventive de la tuberculose par le BCG en France. Deuxième enquête, jan. à mars, 1931. [**Documents for Use in the Study of Vaccination against BCG in France. Second Enquiry, January to March, 1931**].—Paris : Masson et cie.

V. —. (1931). **The Results of BCG Vaccination in France.**—*Brit. Med. J.* Aug. 22nd. 351. [3 refs.]

I. Ascoli is firmly convinced that BCG vaccine is incapable of producing progressive lesions of tuberculosis. The results obtained in Italy from the inoculation of more than 6,500 calves under strictly controlled conditions provide adequate proof of the innocuity of the vaccine.

II. Parisot and Saleur conclude from their experience of BCG vaccine during the past five years that it should in future be considered an important weapon in the campaign against tuberculosis and that when it is systematically applied it brings about a marked reduction in the mortality caused by the disease.

III. Sergent and Ducros-Rougebief claim excellent results from the inoculation of 12,292 children with BCG vaccine in Algiers.

IV. This is a report published by the Pasteur Institute on a second enquiry into the results of prophylactic vaccination with BCG in France. It was found that the mortality from all causes in vaccinated infants aged from one month to one year was 4·6 per cent. and from one to four years 1·5 per cent. The general mortality in non-vaccinated infants reared under average conditions is said to be 6·1 per cent. and the general mortality among non-vaccinated infants brought up in tuberculous environment to be from 16 to 25 per cent.

V. Annotation of IV.—T. M. Doyle.

Tiedemann, H. I. (1932). Ueber einen Fall von Virulenzsteigerung des B.C.G. im Kaninchen. [**On a Case of Increase of Virulence of BCG in the Rabbit**].—*Zschr. Tuberk.* **63.** 413-417.

Eight months before death the animal showed, after a local injection of tuberculin, a corneal ulcer which contained numerous acid-fast bacilli ; these were non-pathogenic and believed to have been derived from BCG received 12 and 26 months earlier. Death was due to advanced tuberculosis and cultures obtained from lungs, kidneys and cornea were fully virulent. The animal had been rigidly isolated and the lesions did not suggest any other source of infection than the cornea.—A. W. Stableforth.

Sabatucci, M. (1932). Le sort du BCG dans les sacs de collodion. [**The Effect on BCG of placing it in Collodion Sacs in the Peritoneal Cavities of Guinea Pigs**].—*C. R. Soc. Biol. Paris.* **110.** 945-947. [2 refs.]

Sabatucci attempted to restore the virulence of BCG by inserting into the peritoneal cavities of guinea pigs collodion sacs containing a weak suspension in Sauton's medium of the organism grown on glycerolated potato. The guinea pigs were killed after intervals varying from 10 to 60 days ; a few animals were kept under observation for a longer period. There was neither loss of condition nor constitutional disturbance in the guinea pigs carrying the sacs ; this suggests either, that BCG does not produce a filtrable form, or that at the most it is one of low pathogenicity.

The intraperitoneal or subcutaneous inoculation of guinea pigs with the contents of the sacs gave negative results. The author concludes that the effect of placing BCG in collodion sacs in the peritoneal cavity was to decrease its original activity.—T. M. Doyle.

I. Nègre, L., & Valtis, J. (1931). Sur les éléments filtrables du Bacille bilié de Calmette et Guérin. [**The Filtrable Elements of BCG**].—*C. R. Soc. Biol. Paris.* **107.** 774-776. [1 ref.]

II. Monaldi, T. de S. (1931). Les éléments filtrables du BCG. [**The Filtrable Elements of BCG**].—*Ibid.* 804-807. [4 refs.]

I. Nègre and Valtis reported in an earlier publication [see this *Bulletin.* **2.** 132.] that the subcutaneous injection of acetone extracts of tubercle bacilli into guinea pigs, previously inoculated with the filtrable virus of the tubercle bacillus, causes the bacilli derived from the filtrable virus to regain their virulence.

In the present note they record that the inoculation of acetone extracts of tubercle bacilli into guinea pigs which had been given a subcutaneous injection of filtrates (Chamberland L_2) of cultures of BCG demonstrated the existence of a non-pathogenic filtrable form of BCG.

II. Monaldi carried out experiments to ascertain whether BCG contained filtrable elements such as have been shown to occur in virulent tubercle bacilli and in some pathogenic paratubercle bacilli. Filtrates of BCG were injected intraspinally, and into the lymph glands of guinea pigs. Twelve of the filtrates used were obtained from seven-day-old cultures of BCG on Sauton media and three filtrates were from the pus of skin abscesses induced by the injection of large doses of BCG.

Six positive results and one doubtful result were obtained with the BCG filtrates and one positive result with the pus filtrates. The acid-fast bacilli obtained were non-pathogenic ; some were coloured and others were pale and granular in appearance.—T. M. Doyle.

I. Pacheco, G., & Artigas, P. de T. (1932). Etudes sur la filtration du virus tuberculeux. Recherche directe du Bacille dans les filtrats. [**Studies on the Filtration of Tuberculosis Virus. Direct Examination for Bacilli in the Filtrates**].—*C. R. Soc. Biol. Paris.* **110.** 133-134. [2 refs.]

II. Ninni, C. (1932). La culture indirecte pour déceler l'ultravirus tuberculeux. [**Indirect Culture Methods for detecting the Ultravirus of Tuberculosis**].—*Ibid.* 169-172. [3 refs.]

III. Ninni, C., & Tsui, T. F. (1932). Les éléments acido-résistants décelables par la méthode de van Deinse sont des Bacilles vrais issus de l'ultravirus tuberculeux. [**The Acid-Fast Elements Detectable by the Method of van Deinse are True Bacilli originating from the Ultravirus of Tuberculosis**].—*Ibid.* 173-175. [3 refs.]

I. By treating filtrates of *Mycobacterium tuberculosis* cultures with sulphuric ether, after the method of Reed and Rice, the authors claim to be able to demon-

strate acid-fast elements in filtrates from Seitz filters and Chamberland L_1 and L_3 candles.

II. By inoculating guinea pigs with filtrates of tissues taken from cases of acute experimental tuberculosis, or with filtrates of cultures grown in special glycerol medium, containing healthy liver tissue, the author has been able to cultivate *M. tuberculosis* on adapted Petragnani and Löwenstein media from the inoculated tissues taken from both first and second passage animals ; that is, provided that material is taken at the right period after inoculation, the filter-passing forms which were inoculated *in vivo* can be made to multiply as micro- and macro-colonies *in vitro* if suitable media are used.

III. The authors consider that the acid-fast bacillary issues of *M. tuberculosis* filtrates obtained by VAN DEINSE are true tubercle bacilli originating from the ultravirus. They have been able to repeat the results of VAN DEINSE, but are unable to confirm the findings of PETRAGNANI, who obtained similar acid-fast elements after inoculating heat-killed filtrates. [VAN DEINSE inoculates the filtrate intraperitoneally into guinea pigs from 24 to 48 hours after injecting a mixture of disodium phosphate and calcium chloride solutions by the same route. He claims that acid-fast elements are demonstrable in peritoneal smears examined three days later].—NORMAN HOLE.

EMSLIE, J. W. (1932). **Recent Advances in Tuberculosis Research.**—*Vet. Rec.* **12.** 935-938.

This paper discusses certain recent advances made in the knowledge of certain aspects of bovine tuberculosis, namely :—the phenomenon of no-lesion and skin-lesion reactors to the tuberculin test, which has become prominent in the United States ; the genetics of tubercle bacilli (the occurrence of S and R strains) ; a survey of the various members of the acid-fast group of bacteria and the filtrable form of the tubercle bacillus.—J. E.

—. (1932). **Bovine Contagious Abortion.**—*J. Scot. Chamber Agric.* **13.** 100-106.

This article refers to a report on contagious abortion prepared by a sub-committee of the Scottish Chamber of Agriculture and submitted to the Directors, and also to correspondence which passed between the Ministry of Agriculture and the Scottish Chamber of Agriculture regarding the disease.

The committee considered that it was " of national importance that some effective measures should be adopted to prevent the spread and secure, if possible, the eradication of the disease in view of the great losses sustained through it."

The committee considered, among other suggestions, the practicability of compulsory notification of the disease. It was recommended that the Government should refer the question to a committee composed of representatives of the livestock industry and of the veterinary profession, to make recommendations for the control and eradication of the disease.

The Ministry informed the Chamber of Agriculture that, in the light of past experience in the administration of the Abortion Order, the compulsory notification of the disease was not considered practical and that they were of the opinion that the most promising line of advance was the discovery of a reliable vaccine.

The Chamber of Agriculture, in a final letter to the Ministry, requested that the Epizootic Abortion Order of 1922 should be rigidly enforced. It is pointed out that there must be a change of policy if any progress is to be made in the control of the disease.—T. M. DOYLE.

—. (1931). **Work in Connecticut with Infectious Abortion in Cattle.**—*Connecticut*

Agric. Expt. Sta. Bull. No. 171. pp. 15-19.

There are now 80 herds under test for the eradication of abortion disease. The disease has been eradicated from 35 herds and nearly so from 16 others.

In carrying out the agglutination test, the following dilutions were used :— 1 : 25, 1 : 50,1 : 75, 1 : 100, 1 : 150 and 1 : 300. In testing a herd which has been free of the disease since 1925, it was clearly shown that full positive reactions do not occur in a clean herd and that some non-specific reactions occasionally occur in the 1 : 25 and 1 : 50 dilutions.—T. M. Doyle.

Pröscholdt, O. (1932). Feststellungen über die Einschleppung der Abortus-Bang-Infektion, die Inkubationsfrist und den Umfang des Verkalbens in verseuchten Beständen. [**Evidence regarding the Introduction of Bang Infection, the Incubation Period and the Extent of Abortion in Infected Herds**].—*Berl. tierärztl. Wschr.* **48.** 573-580.

The author presents full details regarding the methods of introduction of contagious abortion into 30 clean herds. In the majority of cases infection was definitely traced to the buying in of cattle from herds in which abortion was known to exist. In other herds the disease was introduced by feeding on contaminated pastures, by persons carrying infective material or by bulls which had served infected cows. Figures are given of the extent of abortion in these infected herds and it is to be noted that these are highest in those containing few cattle. The incubation period following the introduction of infection was found to vary between 36 and 180 days.—S. J. Edwards.

Mitchell, C. A. (1932). **Brucella abortus Infection of the Udder.**—*20th Ann. Rep. Internat. Ass. Dairy & Milk Inspect. 1931.* pp. 231-241. 4 tables. [10 refs.]

This report summarizes the work done at the Animal Diseases Research Institute, Hull, P.Q., Canada, in relation to the diagnosis of *Br. abortus* infection of the udder. Evidence is presented in tabular form to show that " where agglutinins or complement fixing substances are found in quarters of the udder, those quarters are potential excretors of the *Br. abortus*."

Further study is being given to the subject, as it is considered that the tests may prove of value in the detection of animals potentially dangerous to man.

—Gwilym O. Davies.

I. Reboulleau, Placidi, & Verge. (1931). Avortement à *Brucella abortus* chez la truie. [**Abortion in Sows caused by** *Br. abortus*].—*Bull. Soc. Méd. vét. prat. Paris.* **15.** 194-196.

II. Lockhart, A. (1932). **Swine Brucellosis.**—*Vet. Med.* **27.** 171.

I. Reboulleau, Placidi and Verge report an outbreak of abortion among sows on farms in the neighbourhood of Aubagne (Bouches-de-Rhône). Bacteriological and serological examinations proved the causal agent to be the porcine variety of *Br. abortus*. There was evidence that the infection was introduced with newly purchased sows, obtained from the vicinity of Marseilles, where the infection was prevalent.

The affected sows gave birth to dead pigs or to weak pigs which died soon after birth. During the period from February to May, 169 young pigs died. Good results were claimed from the use of dead vaccines. No case of brucella infection was observed among the attendants, although no precautions were taken.

II. Lockhart states that, in the middle west of America, brucella infection of swine is prevalent and that there is little evidence of relationship between the

disease of cattle and that of swine on the same farms. The losses usually occur from January to March and the disease spreads rapidly through an infected herd. Affected animals show a distinct illness, high temperature, depression, and pain in the joints as evidenced by their reluctance to move. The disease in swine can be successfully controlled by the use of bacterins or with the ordinary avirulent bovine abortion vaccine.—T. M. DOYLE.

HARMS, Amanda H. (1932). **Cattle as a Possible Source of Infection from Brucella abortus var. suis.**—*J. Amer. Vet. Med. Ass.* **81.** 246-249. 3 tables. [7 refs.]

The author isolated from the aborted foetus of a heifer a strain of brucella which resembled *Br. abortus* in that it required several subcultures before adaptation to aerobic growth, but colonies on the surface of agar were similar to those of the porcine strain [*Br. suis* of American workers]. Other characters which distinguished this strain from *Br. abortus*, and showed its resemblance to that of the porcine, were abundant production of hydrogen sulphide in lead acetate agar, failure to reduce nitrates, behaviour on Huddleson's dye plates and agglutination-absorption tests.

During routine testing of blood samples for the diagnosis of Bang's disease the author has observed that a few cows known to have aborted have failed to respond to the agglutination test using *Br. abortus* antigen, but have given positive reactions when tested with an antigen prepared from the above strain. It is thought possible that these cows were infected with the porcine strain.—S. J. EDWARDS.

I. VAN DER HOEDEN, J. (1932). Brucella-Bang-Infektionen beim Pferde. [**Bang's Disease in the Horse**].—*Zschr. Infektkr. Haust.* **42.** 1-39. 7 figs., 14 tables, 7 charts. [12 refs.]

II. SCHOOP, G. (1932). Bangbakterieninfektion bei Widerristfistel und Genickbeule des Pferdes. [**The Infection of Fistulous Withers and Poll-Evil with Bang Bacteria**].—*Deuts. tierärztl. Wschr.* **40.** 520-522. 1 table. [8 refs.]

I. A series of blood sera from 482 horses was tested against *Br. abortus* antigen and, although none of these horses showed clinical symptoms of disease, many of the sera gave positive reactions by agglutination and complement-fixation tests. The author also reports on the examination of 67 horses affected with such conditions as fistulous withers, poll-evil and abscesses in the region of the neck and shoulder ; in a few cases lameness due to tendinitis, bursitis or arthritis was shown. The blood sera of 52 of these clinical cases were positive to the agglutination test with titres of not less than 1 : 400, while the characters of 30 brucella strains recovered were similar to those of *Br. abortus*.

The results of experiments in which brucella were fed to three horses showed that there was a rise in temperature about the third day. Six days later, the organisms were recovered from the blood and at this stage specific antibodies were demonstrated. Abscess formation was not observed in these experimental cases, but the author suggests that in natural cases the organisms become located in certain predilection sites where they cause abscesses.

The injection of dead brucella under the skin of the neck was followed by a local reaction in both natural and experimental cases of infection. In the same way, an ophthalmic reaction similar to that given by mallein or tuberculin was shown 12 hours after injection.

II. The author isolated *Br. abortus* from three cases of fistulous withers and three cases of poll-evil in horses whose blood sera gave agglutination titres of

between 1 : 200 and 1 : 2,000. Regarding the control of these conditions, it is recommended that cattle-grooming utensils should not be used for horses and that foals should not be fed on raw cow's milk.—S. J. EDWARDS.

GILBERT, Ruth, & DACEY, H. Gladys. (1932). **The Isolation of an Organism of the Abortus-Melitensis Group from a Blood Clot, the Serum of which failed to give Agglutination with** *B. abortus*.—*J. Lab. & Clin. Med.* **17.** 345-346. [5 refs.]

Blood was obtained from a woman showing symptoms of undulant fever. The serum failed to agglutinate *Br. abortus*, *Bact. typhosum* and *Bact. paratyphosum* A and B. The blood clot was cultured in liver-infusion broth in a stoppered bottle, and after one week the culture was plated in liver-infusion agar and the plates incubated in 10 per cent. carbon dioxide. By this procedure a brucella organism was isolated. This organism was agglutinated by an anti-abortus serum, but not by the patient's serum. There was no history of contact with goats, cattle or swine, but the patient had drunk raw milk from an abortion-infected herd.

This is only the third reference to the isolation of *Br. abortus* from patients negative to the agglutination test.—S. J. EDWARDS.

I. GEIGER, J. C. (1931). **Epidemiologic Data of Brucelliasis, with Report of Two Human Cases.**—*J. Amer. Vet. Med. Ass.* **79.** 161-169. [19 refs.]

II. HASSELTINE, H. E. (1931). **Undulant Fever in Man.**—*Cornell Vet.* **21.** 256-258 and *North Amer. Vet.* **12.** No. 8. 25-31.

I. The author outlines the disease in man and points out that the symptoms necessitate a laboratory report before a certain diagnosis can be made. He describes the most suitable methods of eliminating the disease in cattle and condemns the use of live vaccine as dangerous to man as well as to the animals. Two cases in cattlemen are described, the evidence pointing strongly to contact infection ; from the blood of one patient a culture, a porcine strain, was obtained.

II. Symptomatic distinction of bovine, porcine or caprine infections is not possible, but the bovine strain cases are less severe. An enormous increase has occurred annually since 1924 in reported cases in the United States and from a study of 435 cases the author has separated three epidemiological groups :—(1) no contact with live stock ; infection from raw milk or cream ; (2) contact with animals on farms and (3) contact with stock or carcasses in the meat industry.

He points out that, while efficient pasteurization methods can control group (1), groups (2) and (3) can only be prevented by eradication, a gigantic but apparently practicable task for the veterinarian.—NORMAN HOLE.

CRUVEILHIER, A., LECLAINCHE, X., & RINJARD, P. (1931). Enquête sur les rapports que présentent, en France, la fièvre ondulante de l'homme et l'avortement épizootique des bovidés. [**An Enquiry into the Relation between Undulant Fever in Man and Bovine Epizootic Abortion in France**]. —*Bull. Off. internat. Epiz.* **5.** 282-288. [2 refs.]

A large proportion of the report is devoted to a discussion of the probability of encountering human brucella infections in France. No account is taken of human infections in areas where true undulant fever due to *Br. melitensis* is common and it is accepted that the porcine strain of *Br. abortus* is not present in France. The enquiry consisted of circularizing 400 veterinary surgeons with a view to ascertaining whether they themselves had ever suffered from any disease which clinically resembled undulant fever and whether they had encountered such cases amongst their clientele. This questionnaire was only sent to veterinary surgeons

practising in areas where bovine contagious abortion is rife and where undulant fever does not exist. 371 replies were received : only 113 of these gave records of infection, and only 50 of them could be investigated serologically ; only 13 gave a positive agglutination reaction.—R. S. ROBERTS.

CARNE, H. R., & CRAMP, R. C. (1932). **The Cause of Caseous Lymphadenitis in Australia.**—*J. Sci. & Indust. Res. Australia.* **5.** 65-66.

CARNE, H. R., & CRAMP, R. C. (1932). **The Cause of Caseous Lymphadenitis of Sheep in Australia.**—*Austral. Vet. J.* **8.** 28-33. [29 refs.]

CARNE, H. R. (1932). **The Diagnosis of Caseous Lymphadenitis by Means of Intradermal Inoculation of Allergic Reagents.**—*Ibid.* 42-47. 1 table. [2 refs.]

In Australia caseous lymphadenitis is apparently solely due to infection with *Corynebacterium pseudotuberculosis ovis*. The authors briefly review the literature dealing with infections due to *C. pyogenes*, *Bact. purifaciens*, staphylococci and diplococci, as seen in Europe and in the Continent of America, but report that, of 62 cases examined at intervals at the New South Wales State Abattoirs, 60 were due to pure *C. pseudotuberculosis ovis* infection and the other two failed to yield growth.

Allergic reagents, as at present known, are of little practical value in the detection of infected sheep by skin reactions. The author has prepared reagents on similar lines to those used with tuberculin, and also following Cassamagnaghi's method, and inoculated them intradermally into the thigh and anal fold. A percentage of both healthy and infected animals (as shown by *post-mortem* examination) gave a reaction of varying intensity. There appeared to be no strain specificity factor involved, as polyvalent reagent gave similar results to monovalent reagents. The excellent results claimed by CASSAMAGNAGHI, therefore, could not be confirmed.

—NORMAN HOLE.

HENDRICKSON, J. M., & HILBERT, K. F. (1932). **A New and Serious Septicemic Disease of Young Ducks with a Description of the Causative Organism, Pfeifferella anatipestifer, n.s.**—*Cornell Vet.* **22.** 239-252.

Investigations were carried out into a disease of young ducks which had caused enormous loss upon three duck ranches in New York State. Several thousand ducks died on each ranch. The losses were chiefly in birds of from three to ten weeks of age, but older ducks sometimes became infected. So far as was known all cases ended in death in from six to twelve hours from the time symptoms were first noticed, but a few birds lived several days. The symptoms, which included severe diarrhoea, were not characteristic. The lesions were those of an acute septicaemia with petechial haemorrhages on the serous surfaces and a severe haemorrhagic enteritis. A conspicuous lesion was a yellowish, fibrinous, oedematous, white exudate covering the surface of the liver and adhering closely to it ; a similar exudate united the pericardium to the heart wall. The blood was usually dark and uncoagulated. Other less common lesions were pneumonia with haemorrhages in the tracheal and bronchial mucous membranes and a peculiar white and brown mottling of the spleen. The lesions, with the exception of the exudate over the liver and heart, were insufficient in themselves to differentiate this disease from duck cholera.

An organism was isolated which the authors tentatively classified in the genus *Pfeifferella* and to which they have given the name *P. anatipestifer*. This organism readily reproduced the disease in experimental ducks (particularly white Pekin ducks) when injected intravenously. Subcutaneous injection and feeding gave

negative results. Chickens are highly resistant, rabbits are insusceptible and guinea pigs become infected following intraperitoneal inoculation. Diagnosis of the disease must rest primarily on the isolation and identification of the causal organism. The following are given as the characteristics of *P. anatipestifer* :—a straight slender rod, non-sporulating, non-motile, occurring singly in cultures, Gram-negative, faintly-staining, non-acid-fast, a strict aerobe, grows better on blood agar than on plain agar. Primary growths take 48 or more hours to become appreciable when incubated at 37° C. The organism is non-haemolytic, gelatin slowly liquefies at room temperature, litmus milk becomes slowly alkaline and digestion of the casein occurs. No growth occurs on potato. Coagulated blood-serum and Dorset's egg medium are slowly digested. Carbohydrates are not fermented. [It will be observed that some of the more important features of the genus *Pfeifferella* are not displayed by this organism].—S. H. Gaiger.

Pacheco, G., Penha, A., Rodrigues, C., & Bier, O. (1932). Sur l'identification de *Salmonella bovis* avec *Salmonella enteritidis*. [**The Identity of** *Bact. bovis* **and** *Bact. enteritidis*].—*C. R. Soc. Biol. Paris.* **110.** 857-858. [1 ref.]

An organism isolated during a bovine epidemic and previously named *Bact. bovis* is considered to be identical with *Bact. enteritidis* as it appears capable of absorbing the homologous agglutinins from a serum prepared against the latter. [No exact data are given, neither is the antigenic structure studied. It will, however, be remembered that the original *Bact. enteritidis* or *Salmonella enteritidis*, according to the nomenclature adopted, was isolated from a bovine animal by Gaertner. Since then there are numerous records of the isolation of this organism and the closely allied Dublin type from bovine animals].—R. Lovell.

Meixner, M. (1931). Adatok a Bacillus viscosus equi biologiájához. [**Contribution to the Biology of** *Bacterium equirulis*].—*Közl. Oesszehas. élét- es kórtan Köréböl.* **24.** 417-432. 3 text figs.

In the interpretation of certain biological characters (variability, spore-formation, viscosity and fermentation) of *Bact. equirulis* there is marked disagreement between the statements of various authors. In order to clear up these discrepancies the writer examined five different strains of this organism. His conclusions are :—

(1) *Bact. equirulis* when cultivated on appropriate media grows readily at room or incubator temperatures. Polymorphic colonies appear on solid media. They may often show subsequent changes which are due to the growth of bacteriophage ; (2) *Bact. equirulis* is a short, Gram-negative, non-motile, non-sporulating, rod-like or occasionally coccoid bacterium which, under the influence of the bacteriophage, may form threads of varying length. Neutral and slightly alkaline (pH = 7·0 to 7·5) media are best suited for its growth, although it grows satisfactorily on slightly acid (pH = 6·5) or strongly alkaline (pH = 7.8) media ; (3) the organism does not cause the formation of indol ; it produces acid but not gas in dextrose, arabinose, saccharose, lactose and mannite, but does not ferment dextrin, dulcite or glycerol ; (4) while the various strains of this bacillus may show certain differences with regard to their agglutinability, they all contain the same agglutinogen which differs from that of other bacteria, especially of the members of the colon-typhoid group, and of *Bact. gallinarum.*

The author considers that, on account of these characters, *Bact. equirulis* represents an independent species in which various strains usually show definite, but unimportant, differences.—A. Kotlán (Budapest).

STROZZI, P. (1931). Enzoozia da bacillo paratifo B Breslavia in un allevamento di oche ed anitre di giovine eta. **[An Outbreak of Disease in Young Ducks and Geese due to Paratyphoid B Bacilli (Breslau Type)].**—*Clin. Vet. Milano.* **54.** 927-934.

The author describes an outbreak of disease which occurred in an acute and subacute form among young ducks and geese, causing a mortality of about 96 per cent. The infection was limited to the palmiped birds on the premises and others mixing with them escaped infection. An organism possessing the cultural, biochemical and serological reactions of the Breslau paratyphoid B bacillus was constantly recovered from the birds subjected to *post-mortem* examination.

—A. LESLIE SHEATHER.

HOLE, N. (1932). **Salmonella Infections in Ducklings.**—*J. Comp. Path. & Therap.* **45.** 161-171. 4 tables. [15 refs.]

Investigations were carried out on three epizootics in ducklings, two in 1930 and one in 1931. The infection in one case was due to *Bact. enteritidis* and in the other two to *Bact. aertrycke* types.

The author is of the opinion that the organism described by GAIGER and DAVIES is a *Bact. enteritidis* type and not *Bact. anatum* and that this organism has not yet been identified in this country.

Included in the experimental work was the examination of eggs from ducks which gave a suspicious reaction to the blood test. The organisms were not recovered from the egg, but the author considers that there is a distinct possibility of egg transmission. [This fact has since been proved by several workers.]

—NORMAN DOBSON.

GRAHAM, J. G. (1932). **Bacterial Synergism—the Formation by *B. typhosus* or *B. coli anaerogenes* from Mannitol of an Intermediate Substance from which Morgan's Bacillus produces Gas.**—*J. Hyg. Cambridge.* **32.** 385-395. [19 refs.]

The term " synergism " is applied to a phenomenon whereby the combined action of two or more micro-organisms effects changes which each by itself is incapable of achieving. The study here recorded consisted of the observation that *Bact. typhosum* alone showed production of acid when grown in peptone water containing mannitol, *Bact. morgani* showed no change, whilst a mixture of the two organisms showed the production of acid and gas. It would appear that *Bact. typhosum* when grown in this medium is capable of producing an intermediate substance which is stable at 100° C., and that if *Bact. typhosum* is subsequently killed and *Bact. morgani* then grown in the medium, this intermediate substance is broken down with the formation of gas.

The amount of gas formed in these experiments depended upon the pH of the medium, since acid inhibits and may kill one or both organisms, but by periodic adjustment of pH the bacteria could be maintained alive for long periods and a greater supply of gas obtained. It was found that in synergic reactions the proportion of hydrogen to carbon dioxide was higher than usually recorded with simple fermentation of glucose by, say, *Bact. morgani.* This corresponds with the high proportion obtained by that organism acting alone on formates. This supports the view that formates act as precursors of gaseous products.—R. LOVELL.

I. OWENS, J. A. (1931). **Hem. Sep. in Pigs following Vaccination.**—*Vet. Med.* **26.** 379.

II. MCDONALD, J. H. (1931). **Atypical Cases of Hem. Sep. in Swine.**—*Ibid.* 380.

I. Owens records an outbreak of swine fever in which 16 pigs died out of a herd of 114. As soon as the diagnosis was established the herd was vaccinated [by the serum-virus method ?]. After vaccination 15 further deaths occurred, which were attributed to haemorrhagic septicaemia ; the mortality ceased after aggressin and serum had been injected.

II. McDonald describes an outbreak of disease in a herd of sows which he considered to be haemorrhagic septicaemia. [Diagnosis was based apparently on the lesions found at autopsy]. The sows were injected with mixed bacterins and haemorrhagic septicaemia aggressin and no further losses occurred.—T. M. DOYLE.

SCHUBERT, J. (1932). Ueber die Vergrünung des Sautonnährbodens durch apathogene Säurefeste und andere Stämme. [**On the Greening of Sauton's Medium by Non-Pathogenic Acid-Fast Bacteria and Other Strains**].—*Zlb. Bakt. I. (Orig.).* **125.** 364-368. [1 ref.]

Results are given showing that various non-pathogenic acid-fast and other organisms produce a green colouration of Sauton's medium and occasionally of other glycerol-containing media. A new medium which is said to emphasize this property and to be of special value for the culture of tubercle bacilli is described. —A. W. STABLEFORTH.

BENHAM, Rhoda W., & KESTEN, Beatrice. (1932). **Sporotrichosis—Its Transmission to Plants and Animals.**—*J. Infect. Dis.* **50.** 437-458. 15 figs., 1 table. [26 refs.]

The authors mention briefly the clinical appearance of sporotrichosis in man and in animals ; in the latter, the disease has been described in rats, dogs, horses and mules. Two plant diseases, " bud rot " of carnations and " silver top " of June grass have also been attributed to a species of sporotrichum viz. *Sp. poae*. The disease of carnations occurs in epidemic form in greenhouses and is carried by mites.

In human beings, it has never been proved that infection arose from a previous human or animal case. Many cases have occurred in workers in plant nurseries, gardeners, florists and others handling plant material. *Sp. schenckii*, the usual cause of human sporotrichosis, has been occasionally found outside the animal body, e.g. in beech bark, horsetail (*Equisetum*), dried oat grains, husks of wheat, on insects such as wasps, ants and flies, in the nasal cavity, on the skin and in the intestinal tract of mammals. The strains of sporotrichum isolated from affected animals appear to belong to the *Sp. schenckii* group ; the species causing disease in plants, *Sp. poae*, is distinct ; a saprophytic species found in soil, *Sp. purinosum*, is also distinct.

A short description is given of five strains used by the authors in their experiments. These strains were *Sp. schenckii*, *Sp. gongeroti*, *Sp. councilmani* (all from human cases of sporotrichosis), *Sp. poae* (from carnations) and *Sp. purinosum* (from soil). A strain of *Sp. schenckii* which had been shown to be pathogenic for white rats was inoculated into carnation buds and rose buds and caused a disease resembling " bud rot." Similar results were obtained after inoculation of any of the other species of sporotrichum studied and also after inoculation of *Penicillium brevi-compactum*. The strain of *Sp. schenckii* recovered from the affected plants was inoculated into rats and monkeys and shown to be pathogenic. The lesions in monkeys resembled the spontaneous disease in human beings. Similar experiments with *Sp. poae* and *Sp. purinosum* afforded no evidence of pathogenicity for man.

The authors believe that their experiments represent the first successful

transmission of a human disease to a plant and suggest that plants may act as intermediate hosts for human infections.—C. McG.

Ayyar, V. Krishnamurti. (1932). **Rhinosporidiosis in Equines.**—*Ind. J. Vet. Sci. & Anim. Husb.* **11.** 11 figs. on 3 plates. 49-52. [8 refs.]

The author figures and describes a case of rhinosporidiosis in a pony which had recurred after surgical removal. The tumour-like nodule was situated on the anterior part of the septum nasi and was slightly papillomatous in appearance. On section the tissue was found to be myxo-fibromatous in character and sporangia in various stages of development were found embedded in it.

The case occurred in the same district as that in which cases have been observed in cattle.—A. Leslie Sheather.

DISEASES CAUSED BY PROTOZOAN PARASITES.

Thomson, J. G., & Hall, G. N. (1931). **Observations on Intestinal Coccidiosis of Sheep in Northern Nigeria.**—*J. Trop. Med.* **34.** 369-373. 14 figs., 2 tables. [46 refs.]

The article contains a concise review of literature upon coccidiosis of sheep and goats and much scattered information has been brought together in it. On examining the data in this form, the following summary of present knowledge of the subject may be made :—

E. faurei Moussu and Marotel, 1902, occurs in sheep and its oocysts possess a micropyle, but no micropyle cap.

E. arloigni Marotel, 1905, occurs in goats and the oocysts have a micropyle and a prominent micropyle cap.

E. intricata Spiegl, 1925, occurs in sheep and the oocysts have a corrugated outer wall, a micropyle and a prominent micropyle cap. Yakimoff and Rastegaieff (1930) described two forms, occurring in the goat, with oocysts devoid of a micropyle.

The parasites may become highly pathogenic for young lambs and death may result 48 hours after the appearance of symptoms, but on the whole pathogenicity appears to be low and tolerance is developed. The lesions may take the form of pedunculated tumours or of flattened whitish spots in the intestinal mucosa. The latter is the commoner form. A high percentage of sheep in Northern Nigeria harbour the parasite.—R. S. Roberts.

Henry, D. P. (1931). **A Study of the Species of Eimeria occurring in Swine.**—*Univ. California Pubs. Zool.* **36.** 115-126. 2 plates, 1 table. [12 refs.]

E. deblieki, the commonly described coccidium of swine, was found in 30 per cent. of pigs raised in California and in 82 per cent. of animals raised in Nebraska and Kansas. In addition to this species, many of the pigs harboured coccidia which, in the author's opinion, have not hitherto been described. The name *E. scabra* has been applied to a species in which the oocyst wall is rough and intersected with dark areas, *E. perminuta* to a species with small oocysts, but resembling *E. scabra*, and *E. spinosa* to a species in which the outer surfaces of the oocysts are studded with spines 1μ in length and 1μ apart.—R. S. Roberts.

Rusvay, K. (1931). A kutyák coccidiosisának magától gyógyult két esete. [**Spontaneous Recovery in Two Cases of Coccidiosis in Dogs**].—*Allategészégügy.* **11.** 47-48.

Two dogs, one six months and the other three months old, showing a natural infestation with coccidia were kept under good sanitary conditions in order to prevent coccidial reinfection. An examination of their faeces by means of a glycerine flotation method was made daily for periods of three and six months respectively. In the faeces of one animal, which was infested with *Isospora bigemina*, oocysts were detected on 33 occasions and up to the 119th day, while in the other, which harboured both *I. bigemina* and *I. rivolta*, positive results were obtained up to the 71st and 76th days respectively. In the latter dog, though heavily infected from the beginning, the definite disappearance of the oocysts occurred much earlier than in the other one. No regularity could be observed with regard to the periodic appearance of the oocysts. As the result of these and earlier observations, the author concludes that spontaneous recovery may be expected in cases of coccidial infections of dogs, provided that reinfections are prevented by means of appropriate sanitary conditions.—A. KOTLÁN (BUDAPEST).

I. LEGG, J. (1931). **The Value of the Blood of Recovered Cattle in Redwater Inoculation.**—*Austral. Vet. J.* **7.** 70-74. [2 refs.]

II. FILMER, J. F. (1931). **Some Notes on Piroplasmosis in Western Australia.**—*Ibid.* 138-141. [1 ref.]

III. YAKIMOFF, W. L. (1931). A propos de l'infection du zébu par les Piroplasmes. (Note préliminaire). [**The Infection of the Zebu with Piroplasmosis. (Preliminary Note)**].—*Bull. Soc. Path. exot.* **24.** 656-657.

IV. LESTOQUARD, F. (1931). Les piroplasmes des Bovins en Turquie. [**The Piroplasms of Bovines in Turkey**].—*Ibid.* 817-819.

V. COOPER, H., & IYER, P. R. K. (1931). **The Diagnosis of "Redwater" (Piroplasmosis) in Indian Cattle.**—*Ind. J. Vet. Sci. & Anim. Husb.* **1.** 296-300. [2 refs.]

I. The first paper discusses the problem of the maintenance of virulent redwater blood for immunization work and points out that the blood of recovered cattle may have lost all virulence 12 months after recovery. Blood to be used for immunization should be tested periodically for virulence.

II. The second paper gives a good description of the history and symptoms of piroplasmosis in Western Australia. The ordinary *Babesia bigemina* of Western Australia is said to differ slightly from the African parasite in morphology and in staining and it may differ in its resistance to trypan blue. A parasite which is thought to be a small form of *B. bigemina* is described and also a much smaller parasite which SOHNS, who encountered it in Australian cattle in Java, declares to be identical with *Babesiella* [*Babesia*] *berbera*.

III. The third paper describes the experimental infection of a zebu with *Babesia bigemina* and *Theileria mutans*. The author points out that veterinarians, particularly Russian, consider the zebu resistant to piroplasmosis.

IV. In the fourth paper the author records the occurrence in Anatolia of *B. bigemina*, *Babesiella* [*Babesia*] *berbera*, *Theileria mutans*, *Th. dispar* and *Anaplasma marginale*.

Infection with *Babesiella* [*Babesia*] *berbera* was characterized by an incubation period of from 10 to 12 days and grave disease with jaundice and haemoglobinuria. Ichthargan appeared to be of some value in treatment. In *Theileria dispar* infection there is an acute stage followed by a long period of chronic infection. The author notes that old animals, born in the area, sometimes contract theileriasis and die as the result of the infection.

V. The authors point out the difficulty in the diagnosis of redwater in India, where the disease may vary from acute severe forms to a mere transient fever.

Blood smears may be taken when piroplasms are rare or absent and after death the piroplasms may be degenerated and appear only as a chromatin speck surrounded by a thin halo of cytoplasm. The classical lesions in the spleen, liver and other organs are not always present, but the authors believe that an oily dark-bluish colouration of the kidney capsule, with a violet-blue colouration of the cortex due to congestion may be relied upon for diagnosis.—U. F. RICHARDSON.

NIESCHULZ, O. (1931). Ueber Darmflagellaten von Tabaniden in Java. [**The Intestinal Flagellates of Tabanidae in Java**].—*Zschr. Parasitenk.* **3.** 267-268.

LWOFF, Marguérite. (1931). Remarques sur la culture de quelques *Leptomonas* (Trypanosomides). [**Remarks on the Cultivation of Certain Leptomonas**].—*C. R. Soc. Biol. Paris.* **107.** 447-449. [8 refs.]

LWOFF, Marguérite. (1931). Culture de *Strigomonas* (*Leptomonas*) *fasciculata* (Trypanosomide) en présence de corps à fonction peroxydasique. [**The Cultivation of *Strigomonas* (*Leptomonas*) *fasciculata* in the Presence of Bodies which function as Peroxidases**].—*Ibid.* 1428-1431. [1 ref.]

The first paper discusses the crithidia found in tabanidae in Java and their relationship to animal trypanosomiases. Crithidia were found in *Tabanus rubidus*, *T. striatus* and *T. rufivintus*, about 20 per cent. of flies being infected. The flies have on this account been considered important in connection with surra, but the author points out that *Trypanosoma theileri* occurs in the blood of Javan buffaloes and that the crithidia may be connected with that trypanosome.

The other two papers deal with the amount of blood required in culture media by various *Leptomonas* and *Strigomonas*. It was found that *Strigomonas fasciculata* of *Culex* and *Anopheles* would grow in peptone water to which 15 to 20 drops of a 20 per cent. solution of gum arabic had been added. If an artificial oxidase, made from potassium ferrocyanide and ferrous sulphate, was added, then the gum arabic could be reduced to from five to ten drops.—U. F. RICHARDSON.

THÉVENOZ, L. (1932). Recherches sur les sarcosporidies des bovidés en Suisse. [**Investigations regarding Bovine Sarcosporidiosis in Switzerland**].—*Zlb. Bakt. I.* (*Orig.*). **124.** 458-465. [11 refs.]

As cases of sudden death among cattle in Switzerland have been attributed to infestation with sarcosporidia, the author took up the subject with a view to determine the frequency of occurrence of the parasite and the probability of infestation being a cause of sudden death.

The material used was collected from 100 apparently healthy bovines with the following age distribution :—22 at 16 to 24 months, 53 at 25 to 60 months and 25 from 5 to 12 years. Fragments of muscular tissue from the heart, terminal part of the oesophagus, masseters, and diaphragm were taken in each case, and, two sections from each examined.

Parasites were found in every animal, and in nearly every case they were present in the heart and oesophagus.

Comparison between the sections of the different age groups indicated that the parasite tended to disappear with increasing age. Up to the age of two years the number of parasites per unit volume of muscle increases. The diminution with increasing age is attributed by the author not only to degeneration of the parasites, but also to immunization. If there were no degree of immunity established the disintegrating parasites would be replaced by fresh ones.

Thévenoz compares his findings with those published by VILJOEN and HEDINGER in South Africa, and points out that (a) he has not found the parasite

to be anything like so numerous and (b) he has not observed any notable increase in numbers in diseased animals.

In his sections the author has found centres of leucocyte infiltration of the muscular tissue which were apparently quite unconnected with the sarcosporidial invasion. He has not found, as HEDINGER claims to have done, any evidence of local eosinophilia.

The frequency of sarcosporidia in animals and their infrequency in man indicates that the parasite is not a source of danger to man. The toxin which is claimed to be produced by the parasite is quite harmless for man by ingestion, at least after cooking.—A. LESLIE SHEATHER.

DISEASES CAUSED BY FILTRABLE VIRUSES.

VALLEÉ, H., CARRÉ, H., RINJARD, P., GALEA, G., GELORMINI, & HARISPE. (1932). Variations de la virulence aphteuse et aphtisation des bovidés. [**Variations in Virulence of the Virus of Foot and Mouth Disease and in the Production of Lesions by such Virus**].—*Rev. gén. Méd. vét.* **41.** 325-331. [3 refs.]

Repeated passage of cattle virus by intradermal inoculation of guinea pigs may result in a transitory loss of virulence for cattle. Experiments carried out to determine the value of such attenuated viruses in cattle immunization show that contact control animals may develop the disease in a very virulent form. The results obtained from the immunity tests were variable, as lesions were not constantly produced, and it was found, as has been previously shown, that lesion formation is necessary if any degree of immunity is to be obtained. In view of these facts the value of such a method of vaccination is doubtful.—NORMAN HOLE.

—. (1931). **Suggested Origin of Ulster Foot-and-Mouth Outbreak.**—*Vet. Rec.* **11.** 1261.

The officials of the Ulster Ministry of Agriculture claim to have discovered the origin of the foot and mouth disease outbreak which occurred in County Down. On May 22nd cauliflowers from Holland (where 700 outbreaks were confirmed during the month of May, 1931) were brought on to a farm. During the last two or three days of May and the first two or three days of June infection existed on this farm. Every case of disease on 12 farms could be traced to the one farm in Northern Ireland and the only apparent cause of infection on that farm was continental vegetables.—NORMAN DOBSON.

I. BEATON, W. G. (1931). **The Use of Formalised Virulent Rinderpest Blood as a Vaccine.**—*Vet. J.* **87.** 530-532. [2 refs.]

II. JACOTOT, H. (1931). Recherches sur la vaccination contre la peste bovine. [**A Study of Vaccination against Rinderpest**].—*Bull. Soc. Path. exot.* **24.** 789-793. [2 refs.]

I. Beaton carried out experiments to determine the antigenic value of formolized rinderpest blood for the immunization of cattle. Two vaccines were prepared : one was virulent blood in contact with 3 per cent. formol for six days ; the second vaccine was prepared similarly, but contained in addition 10 per cent. tapioca. Both vaccines were inoculated subcutaneously into susceptible cattle in 10 c.c. doses and immunity tests with virulent blood [dose not stated] were carried out after intervals of three and four weeks.

Some animals were given a second dose of vaccine after an interval of four weeks and were tested for immunity three, four and five weeks later.

Neither of the vaccines conferred any appreciable protection, whether given in single or double doses.

II. Jacotot states that vaccines prepared from virulent organic extracts confer only a transient immunity against rinderpest and that the protection given is not absolute. In some cases, admittedly not numerous, the inoculation of virus into vaccinated animals does not confer an active immunity.

He observed that, in animals inoculated with a measured quantity of vaccine, the reaction to a subsequent inoculation of virus varied with the quantity of virus given. He believes that, in order to transform the transient immunity of vaccination into an active immunity, it is necessary to inoculate two doses of virus at an interval of a few days, and that, in order to eliminate the possibility of severe reactions, a dose of immune serum should be given simultaneously with the first dose of virus.

—T. M. Doyle.

Morcos, Z. (1931). **Rinderpest Virus and Laboratory Animals.**—*Vet. Rec.* **11.** 231-232. 1 chart, 1 photograph.

This article deals with attempts to infect laboratory animals with rinderpest. The virulence of the blood used was controlled by testing on Cyprus bulls. Guinea pigs, rabbits and white rats fed on virulent blood or inoculated with it showed no departure from normal. Four dogs fed on virulent material and inoculated with it showed a rise of temperature, whilst two control dogs remained normal. This febrile condition was passed through two other dogs and an attempt was then made to infect an ox. The result was negative, but when the animal was tested with virulent blood it proved to be immune to rinderpest.—U. F. Richardson.

I. Manninger, R. (1932). A sertéspestis elkülönitö kórjelzéséröl. [**On the Specific Diagnoses of Swine Fever**].—*Allatorv. Lapok.* **55.** 6-12.

II. Zoltán, H. (1932). Elválasztási korban levö és 7-8 hetes szopósmalacok sertéspestis elleni szimultán ojtása. [**Simultaneous Inoculation of Suckling Pigs at the Weaning Age and at the Age of Seven to Eight Weeks against Swine Fever**].—*Ibid.* 12-14.

III. Pataki, P. (1932). A sertéspestis elleni védekezésröl. [**On Preventive Measures against Swine Fever**].—*Ibid.* 14-19.

IV. Schneider, L. (1932). Atvészelt kocák szopós malacainak sertéspestis elleni szimultan ojtásáról. [**The Simultaneous Inoculation against Swine Fever of the Suckling Pigs of Sows which have had the Fever**].—*Ibid.* 19-20.

V. Lobl, J. (1932). Gyakorlati megfigyelések a sertéspestis ellenes szimultán ojtasokról. [**Practical Observations on Simultaneous Inoculations against Swine Fever**].—*Ibid.* 20-22.

[Origs. in Hungarian : abst. from English translations].

I. The author discusses briefly the principal lesions of swine fever and the secondary lesions found in association with that disease. He points out the difficulty of differentiation between the so-called " swine fever ulcers " and the lesions caused by paratyphoid bacteria.

II. Zoltán considers that two decades of experimentation on the serum-virus method of immunization against swine fever have resulted in the elaboration of an almost perfect procedure of preventive inoculation.

In the case of suckling pigs he inoculates them by the serum-virus method followed 15 days later by an injection of virus and a third dose of virus is given 30 days later.

III. Pataki reports that during 1931 in Hungary the losses caused by swine

fever far exceeded those usually encountered and he believes this to be the result of a highly virulent type of virus.

The use of the serum-alone method of immunization was definitely incapable of checking the spread of the epizootic. He has learned from seven years' experience that pigs treated by the serum-virus method are actively immune after a lapse of one year. He has obtained excellent results with this method in the inoculation of infected herds and in pregnant animals and found that abortion rarely occurs.

He recommends the widespread application of the serum-virus method in Hungary.

IV. Schneider found that suckling pigs can be actively immunized against swine fever by means of the serum-virus method.

V. Lobl is strongly in favour of the serum-virus method of immunization for the control of swine fever and considers that the serum-alone method will in future be relegated to a purely subordinate place.—T. M. Doyle.

Donatien, A., & Lestoquard, F. (1932). La Peste porcine. Nouvelles acquisitions. [**Further Information on Swine Fever**].—*Rev. vét. et J. Méd. vét.* **84.** 121-141. [2 refs.]

The authors discuss in general terms the problem of swine fever and the association of *Past. suiseptica* and *Bact. suipestifer* with the virus disease. Reference is made to methods for the preservation of the virus and to its resistance to certain chemicals. Although there is some variation in the virulence of different strains of the virus, passage through susceptible young pigs causes neither attenuation nor exaltation of the original virulence.

Donatien and Lestoquard describe in detail the symptoms and lesions of the disease and, like some other writers on swine fever, they refer to the existence of " carriers " as a source of infection without, however, producing any evidence that such animals occur. They claim that immune serum possesses curative properties and that it gives good results even when used on pigs in the initial stage of infection. [General experience is that immune swine fever serum is of little curative value].

The serum-alone method and the serum-virus method for the immunization of pigs are discussed.—T. M. Doyle.

Donatien, A., & Lestoquard, F. (1932). Des incidents possibles dans l'immunisation contre la peste porcine. [**Accidents following the Serum-Virus Method of Immunization against Swine Fever**].—*Bull. Acad. vét. France.* **5.** 187-196.

It is now recognized that the state of health of the pig at the time of inoculation is the most important factor in the serum-virus method of immunization against swine fever. Losses following inoculation, which were formerly attributed to weak serum or avirulent virus, are now known to be frequently the result of latent infection with swine fever virus, or of *Bact. suipestifer* infection or heavy infestation with parasites.—T. M. Doyle.

I. Aujeszky, A. (1931). Háziállataink veszettség elleni védóójtása 1929-ben. [**Vaccination of Domestic Animals against Rabies during 1929**].—*Allatorv. Lapok.* **54.** 67-71.

II. Kerbler, N. (1931). A veszettség elleni védekezésról. [**On the Control of Rabies**].—*Allategészségügy.* **11.** 113-115. 4 tables. [3 refs.]

I. In this article a detailed account is given of the results obtained by the preventive vaccination of dogs against rabies in Hungary during 1929. The

vaccination is voluntary and consists of a single subcutaneous injection of from 3 to 5 c.c. of vaccine prepared by the slightly modified method of Kondo, the dose depending upon the size of the dog. Of 5,344 dogs vaccinated, 0·1 per cent. showed rabid symptoms. In these cases, however, the evidence indicated that the infections occurred such long intervals after vaccination (more than a year) that immunity could not be expected. The author concludes with the statement that this method of vaccination may conveniently be practised in the field and that there is no danger in its use.

The results in 2,306 cases of post-infectional vaccination of various domestic animals in 1929 were practically the same as in previous years. Of all animals vaccinated 1·28 per cent. succumbed from rabies, considerably less than in the case when no vaccination was carried out.

II. The author points out that, while prophylactic police measures (dog tax, muzzling, etc.), if strictly followed, may be considered to be satisfactory in the control of rabies, there may be countries in which, on account of favourable geographical conditions, such measures alone do not yield the results expected. Under such conditions a combination of suitable police measures and preventive vaccination of dogs appears to represent the most effective means of controlling the disease.—A. Kotlán (Budapest).

I. Ananiadès, B., & Antoniadès, C. (1932). Syndrome gastro-intestinal de la rage chez un chien. **[Gastro-Intestinal Syndrome of Rabies in a Dog].**—*Rev. gén. Méd. vét.* **41.** 331-332. [4 refs.]

II. Lisi, G. (1932). Un cas très singulier de rage chez le Chien. **[A Very Uncommon Case of Rabies in the Dog].**—*Rec. Méd. vét.* **108.** 417-418.

I. It is recognized that, in rabies of the dog, lesions of gastro-enteritis may be found on autopsy. Puntoni has recently published his observations on six cases of rabies in dogs in which the gastro-intestinal derangement masked all other symptoms. In his opinion sufficient importance has not been attached to the gastro-intestinal syndrome which may occur in canine rabies. Bailly, Velu and other authors have also drawn attention to this matter.

According to the present authors, rabies of an intestinal type is not uncommon in Greece. They record in detail the history of a case. The original diagnosis was a haemorrhagic gastro-enteritis. The dog did not at any time exhibit a change of behaviour, aggressiveness, inco-ordination of movement or signs of paresis or paralysis. The owner was accidentally injured while trying to administer medicine forcibly to the dog and his appreciation of the frequent occurrence of rabies in dogs in Greece led him to raise the question of this disease. Antirabic treatment was administered to him at his request, not because rabies was suspected. The dog died suddenly on the third day after coming under observation. On autopsy there was found to be a congestion of the whole intestinal tract and marked haemorrhagic areas were present in the stomach and duodenal mucous membrane. No foreign bodies were found in the stomach. Negri bodies were found on histological examination of the brain and a rabbit inoculated with an emulsion of the medulla died of rabies. The authors emphasize the need for caution in the forced administration of medicaments to dogs even when rabies is not suspected.

II. The classical clinical picture of rabies in dogs is in some cases subject to considerable modification and indeed there is probably no affection more proteiform. In the present note the author describes the case of a dog which was captured and kept under observation because it had bitten a girl. A profound melancholia was the only noticeable sign of abnormality. During a period of 15 days the animal ate and drank normally and showed no symptoms suggestive of

rabies. The only peculiarity observed was a disinclination to move from the corner in which it lay except when food was presented to it. On the 16th day the animal began to refuse food and only drank a small quantity of milk ; when taken out it was slow in its movements. It showed no reaction whatever to stimuli and could be handled easily ; the back was slightly arched and the pupils were somewhat dilated. The lower jaw was not paralysed. The dog was found dead on the 17th day after it had been captured. On autopsy the kidney, muscles and heart were congested, the stomach and urinary bladder empty and slight haemorrhagic erosions were seen in the pyloric mucosa. The meningeal vessels were congested. Histological examination of the cornu ammonis revealed the presence of Negri bodies. Two rabbits inoculated into the anterior chamber of the eye died on the 24th and 36th days respectively, having shown symptoms referred to as those of the paralytic form of rabies.—I. A. GALLOWAY.

I. ANDERSON, C. (1931). Complément à l'étude du pouvoir pathogène du virus de Sidi Salem. Sensibilité du renard et du chacal. [**Susceptibility of the Fox and Jackal to the Virus of Sidi Salem**].—*Arch. Inst. Pasteur Tunis*. **20.** 315-316. [2 refs.]

II. REMLINGER, P. (1932). L'Oulou-Fato n'est-il qu'une Rage atténuée ? [**Is Oulou-Fato an Attenuated Rabies Virus ?**].—*Bull. Soc. Path. exot.* **25.** 118-123. [3 refs.]

I. Anderson has proved the susceptibility of the fox and jackal to the Sidi Salem virus.

II. Remlinger discusses the virulence of the virus " Oulou-Fato " which was proved by NICOLAU, MATHIS and Mme. CONSTANTINESCO [see this *Bulletin*. **2.** 332.] to be a rabies virus, but of an attenuated strain. Under natural conditions human beings are rarely infected with this virus. Remlinger refutes point by point the various arguments advanced in favour of the virus being an attenuated strain.—T. M. DOYLE.

I. RHOADS, C. P. (1931). **Immunization with Mixtures of Poliomyelitis Virus and Aluminium Hydroxide.**—*J. Exp. Med.* **53.** 399-404. 4 tables. [4 refs.]

II. —. (1931). **The Spread of Poliomyelitis.**—*Lancet*. **221.** 1305-1306. [8 refs.]

III. HURST, E. W. (1931). **The Occurrence of Intranuclear Inclusions in the Nerve Cells in Poliomyelitis.**—*J. Path. & Bact.* **34.** 331-333. 16 figs. on 1 plate. [4 refs.]

IV. HURST, E. W. (1932). **Further Observations on the Pathogenesis of Experimental Poliomyelitis : Intrathecal Inoculation of the Virus.**—*Ibid.* **35.** 41-52. 1 fig., 2 plates, 1 table. [8 refs.]

I. The author states that the results of the preliminary experiments here recorded indicate that the virus of poliomyelitis can be inactivated by a certain preparation of aluminium hydroxide and that this effect is seen at neutrality and at a pH of 5·5, but not at a pH of 8·8. It is further indicated that, while monkeys treated by repeated subcutaneous injections of poliomyelitis virus so inactivated showed no symptoms of disease as a result of such treatment, they proved to be immune to intranasal instillation and intracerebral inoculation of virus and their sera developed neutralizing antibodies.

[No data are given as to the relative stability of the virus over a range of pH from 5·5 to 8·8. If the acidity (pH 5·5) was not harmful to the virus it was probably adsorbed on to the aluminium hydroxide and very conceivably could have been eluted by washing in an alkaline fluid. Any immunity which resulted

in the inoculated animals might be due to elution from the adsorbent *in vivo* of small traces of virus incapable of producing recognizable disease but sufficient in amount to produce an immunity response].

II. This editorial follows a study by SCOTT BROWN, in the same volume (p. 1287), of an epidemic of the bulbar type of poliomyelitis in a boarding school. The manner in which infection is spread is discussed, the portal of entry being given particular attention. It has been suggested that milk and butter may be responsible for spread, so it is obvious that all milk supplied to such institutions should be sterilized and other dairy products be above suspicion. The use of convalescent serum is now being strongly advocated in such epidemics and apparently has given good results in the hands of many.

Arising out of these observations there is also strong reason to believe that, as in diphtheria, large numbers of people may acquire active immunity to poliomyelitis by infection without recognizable symptoms. The writer of the editorial evidently believes that it is preferable to risk the possible danger of starting new epidemics by disbanding the school immediately the first case is diagnosed than to keep a large number of children massed together where isolation is impossible and spread facilitated by the children sleeping in dormitories.

III. Poliomyelitis tissues were fixed in sublimate-formol or Zenker formol with subsequent staining by Mallory's phloxin-methylene blue [see MCCLUNG, C. E. (1929). "Microscopical Technique." New York: Hoeber]. The intranuclear bodies described could also be electively stained by Giemsa or panchrom. By routine staining methods they were not sharply differentiated from other nuclear structures. Their size, number and staining properties are described and illustrated. They were found in the large anterior horn cells and less often in the smaller nerve cells of the anterior and posterior horns, but any of the nerve cells of the brain stem and the Betz cells of the motor cortex may apparently be similarly affected. The cells containing them were damaged but the inclusions were never found in completely necrotic cells. They were never found in the glial nuclei. They were found during the first three days of paralysis in 25 out of 28 monkeys and in one human case. Examination of 24 pathological and normal controls gave negative findings. The present account confirms and agrees closely with COVELL's [(1930). *Proc. Soc. Biol. New York.* **27.** 927.] description of acidophilic inclusions in experimental poliomyelitis.

IV. From the results of experiments described in previous communications the author alone and with FAIRBROTHER concluded that, after inoculation of monkeys by the intracerebral, intranasal and intraneural routes, the virus of poliomyelitis spreads mainly by the axis cylinders and that the cerebrospinal fluid plays a minor part in disseminating the infection. The present paper deals with the results of experiments made to determine the distribution of both virus and lesions in monkeys after intrathecal inoculation. Evidence was obtained also in this case that the axis cylinders determine the dissemination of virus which has penetrated the nervous tissue. The author concludes that there is no reason to believe that the mode of production of poliomyelitis in man is dissimilar from that in the experimental animal and that there is no evidence at present available which speaks against an axonic entry of the virus or necessitates the participation of the cerebrospinal fluid in its spread through the nervous system.—I. A. GALLOWAY.

JUNGEBLUT, C. W. (1932). **The Effect of Concentration and of Various Tissue Constituents on the Virulence of the Poliomyelitis Virus.**—*J. Immunol.* **22.** 99-107. 3 tables. [8 refs.]

The author's conclusions from the results of his experiments are that :—

(1) the titration of poliomyelitis virus cord suspensions of varying percentages shows that there is a particular concentration with maximum virulence below which the dilutions become progressively less infective and above which virulence is likewise diminished ; (2) Berkefeld filtrates of virus cord suspensions are at times more virulent than corresponding unfiltered suspensions although exceptions do occur ; (3) neither normal monkey cord nor normal monkey brain when added *in vitro* to virus filtrates has any appreciable effect on the virulence of the virus ; the results with convalescent cord are too irregular to indicate clearly the presence of a neutralizing principle in the immune tissue and (4) normal monkey testicle added to the virus filtrates *in vitro* frequently produces a conspicuous diminution of virulence of the virus in the supernatant fluid. The extent of the antagonistic effect varies with different monkey testicles. Normal rabbit testicle under similar conditions seems slightly to enhance the virulence of the virus.

[Most investigators find that Berkefeld filtrates are less active than the virus emulsions from which they are prepared. The author confirms this observation in only two cases out of five.

The variation in incubation period apparently shown by the monkeys inoculated with the different virus emulsions or filtrates might quite easily have been met with in an experiment in which the same number of monkeys were inoculated with the same dose of a virus emulsion, especially if the strain of virus was not a particularly virulent one. On referring to table 3 one would be forced to conclude that if, as the author states, normal rabbit testicle appears to enhance the virulence of the virus, normal monkey cord, brain and ovary have a similar effect].

—I. A. Galloway.

Lestoquard, F., & Ekrem, I. (1932). L'anémie pernicieuse des petits ruminants en Turquie. [**Pernicious Anaemia of Small Ruminants in Turkey**].—*Rev. vét. & J. Méd. vét.* **84.** 11-17. 3 charts.

The authors describe a virus disease affecting sheep, particularly imported merinos, in Anatolia. It takes the form of a pernicious anaemia and is identical with the disease of sheep in Algeria previously studied by Donatien and Lestoquard [see this *Bulletin.* **1.** 211].—J. E.

Glover, R. E. (1931). **Immunisation of the Fowl and the Pigeon against Epithelioma Contagiosum.**—*2nd Rep. Direct. Univ. Cambridge. Inst. Anim. Path.* pp. 1-20. 4 figs. on 2 plates, 12 tables. [43 refs.]

In an earlier report the author described experiments on the virus of epithelioma contagiosum (fowl pox) [see this *Bulletin.* **2.** 86]. In the present paper he reports the results of experiments on the immunization of fowls and pigeons against fowl pox and pigeon pox respectively. [The term epithelioma contagiosum is used which of course refers to only one of the manifestations of the disease ; the term fowl pox, or pigeon pox is more suitable as it embraces all the lesions of the disease].

The experiments were carried out on fowls and pigeons and the tests for immunity were made by inoculating falling dilutions of virus on to the skin or comb. Glover discusses immunization with (1) unattenuated virus, (2) physically or chemically modified virus and (3) biologically modified virus.

Experiments with unattenuated virus, inoculated either on to the skin or subcutaneously, showed that this method was followed by fairly extensive local lesions with scab formation and that there was sometimes a considerable loss in condition. He surveys briefly the work which has been carried out on the preparation of a vaccine with heated virus. He found that it conferred a short immunity which was weakened by the 8th week and had entirely disappeared by the 24th

week, and concluded that the method is unlikely to be of practical value under field conditions. Tests were made of vaccines prepared with virus treated with phenol, formalin, and chloroform and it was found that a single dose of vaccine prepared by any of these methods had little protective value ; two doses were somewhat more effective, but with the exception of the carbolized vaccine, the immunity conferred was of short duration.

Glover tested the immunizing value of pigeon pox virus against fowl pox and found that it protected against severe natural infection. No evidence of immune bodies was found in the sera of fowls or pigeons recovered from or hyperimmunized against fowl pox or pigeon pox respectively.—T. M. Doyle.

Donatien, A., & Lestoquard, F. (1932). Recherches expérimentales sur le virus claveleux. Association d'un virus fort et d'un virus faible. [**Experiments on a Mixture of a Strong and a Weak Strain of Sheep Pox**].—*C. R. Soc. Biol. Paris.* **110.** 748-749. [1 ref.]

The authors have already described the properties of two different strains of sheep pox virus [(1930). *C. R. Soc. Biol. Paris.* **104.** 269]. They now state that after repeated passage neither has suffered any alteration in its characteristics. The subcutaneous inoculation of the more active virus produces an abundant quantity of a virulent exudate, but this material is unsuitable for the production of sensitized virus since, when inoculated with 20 c.c. of antiserum, it still produces definite dermal lesions. The other strain is so attenuated that the majority of sheep inoculated subcutaneously are resistant : moreover, sensitization with antiserum gives a vaccine which often fails to protect susceptible sheep.

It has been found, however, that a mixture of the two strains yields a virus of intermediate activity which is admirably suitable for the production of sensitized virus.—R. E. Glover.

I. Yaoi, H. (1931). Sur la purification du vaccin antivariolique et l'application du vaccin purifié à la pratique. [**Method of Application of a Purified Vaccinia**].—*Bull. Off. internat. Hyg. publ.* **23.** 1807-1814. [1 ref.]

II. Awad, L. (1931). Expériences sur la purification du virus vaccinal au moyen de l'adsorption par le Kaolin. [**Purification of Vaccinia by Kaolin**]. —*Ibid.* 1815-1817. [1 ref.]

I. In view of certain disadvantages of the cutaneous method of vaccination, in particular the occasional development of secondary infections through the presence of contaminating organisms, the author has inoculated 589 persons subcutaneously with his purified vaccine. He claims that the method is capable of conferring an immunity, while the reactions are less severe than with the cutaneous application of untreated lymph.

II. Awad has carried out a series of experiments in the rabbit with Yaoi's product and has failed to confirm the value of the vaccine. It is stated that, on account of the numerous manipulations which are necessary, the purified vaccine loses a great part of its virus content and after two weeks in the cold store becomes completely inert.

Tsurumi, on behalf of Yaoi, points out that Awad tested the vaccine by the dermal route instead of by subcutaneous inoculation. He admits that the purified product may become spontaneously attenuated, but asserts that it is still capable of inducing an adequate immunity when used according to the instructions of the originator.—R. E. Glover.

Biglieri, R. (1931). Essais de vaccination par des émulsions de neurovariole

tuée par l'éther, l'acide phénique, ou le formol. [**Attempt at Vaccination with Emulsions of Neurovariola killed by Ether, Carbolic Acid or Formalin**]. —*C. R. Soc. Biol. Paris.* **108.** 673-674. [1 ref.]

The author concludes that the virus of *neurovariola* killed by ether, phenol or formalin does not give any protection against infection with living *variola* virus. [The italics are the abstractor's. Biglieri was surely using neurovaccinia virus].—I. A. GALLOWAY.

DYER, R. E., WORKMAN, W. G., RUMREICH, A., & BADGER, L. F. (1932). **The Preparation of a Vaccine from Fleas Infected with Endemic Typhus.**—*Publ. Health Rep. Washington.* **47.** 1329-1331. [7 refs.]

The authors have prepared a vaccine from the rat flea, by feeding a number on white rats infected with endemic typhus, removing and emulsifying in salt solution, and exposing to 0·4 per cent. phenol for five days. The value of such a vaccine in guinea pigs appears to depend upon the potency of the virus present in each flea ; the results obtained with fleas containing 50 infective guinea pig doses suggest that a considerable degree of protection might be obtained if fleas containing 128,000 infective doses, as reported by Dyer *et alia* (1932). *Publ. Health Rep. Washington.* **47.** 987, were employed.—NORMAN HOLE.

I. TWORT, F. W. (1931). Les agents bactériolytiques filtrables et transmissibles (Bactériophage). [**Filtrable and Transmissible Bacteriolytic Agents (Bacteriophage)**].—*Ann. Inst. Pasteur.* **47.** 459-469. [12 refs.]

II. D'HÉRELLE, F. (1931). Le phénomène de Twort et la bactériophagie. [**Twort's Phenomenon and Bacteriophagic Action**].—*Ibid.* 470-471. [3 refs.]

III. FLU, P. C., & RENAUX, E. (1932). Le phénomène de Twort et la bactériophagie. [**Twort's Phenomenon and Bacteriophagic Action**].—*Ibid.* **48.** 15-18 [2 refs.]

I. Twort submits the evidence which supports the view that the filtrable and transmissible bacteriolytic agents originally described by him (Twort's phenomenon) were of exactly the same nature and possessed the same characteristics as the bacteriophage later described by D'HÉRELLE.

II. This note was apparently published under peculiar circumstances. It forms part of a polemic which has taken place through the medium of various scientific journals [see this *Bulletin.* **2.** 334]. In it d'Hérelle suggests that an experiment should be carried out by a competent bacteriologist and demonstrated to a referee named by himself, Professor FLU, to confirm or disprove certain observations made by GRATIA [(1931). *Ann. Inst. Pasteur.* **46.** 1.] in support of the argument in favour of the identity of Twort's phenomenon and the bacteriophage phenomenon of d'Hérelle.

III. This short note summarizes the results of an experiment carried out by the authors at D'HÉRELLE'S request [see II above]. The protocol of the experiment was set out by D'HÉRELLE [(1931). *Ann. Inst. Pasteur.* **47.** 470.] " to reproduce with an antistaphylococcal bacteriophage, Twort's ' vitreous material ' (' glassy areas ') consisting of fine granulations staining a reddish colour with Giemsa, with all its characteristics, notably sterility, power of propagation and transmissibility, and not simply secondary resistant cultures." The results recorded satisfy the protocol and bring confirmation and support to GRATIA'S claims.

—I. A. GALLOWAY.

KLIGLER, I. J., & OLITZKI, L. (1932). **Studies on Protein-Free Suspensions of Viruses. IV. The Antigenic Properties and Serological Reactions of**

Protein-Free Suspensions of Phage.—*Brit. J. Exp. Path.* **13.** 237-248. 5 tables. [10 refs.]

In continuation of previous work [see this *Bulletin.* **1.** 223 and **2.** 498.] the authors have now produced antibodies to protein-free and unpurified suspensions of phage from rabbits. A phage antibody, associated with the serum globulin fraction, can readily be produced by intravenous inoculations and, whilst it is shown that the phage is a definite antigenic entity, the antigen-antibody reaction does not seem to be of the toxin-antitoxin type, as has been supposed, for complement plays a part in the reaction, which is not reversible. It seems more like an antigen-amboceptor reaction. A preliminary experiment with fowl pox virus suggests its antigenic properties to be similar to those of the phage.

—Norman Hole.

DISEASES CAUSED BY METAZOAN PARASITES.

Getz, T. (1932). **Hypoderma lineatum in Horses.**—*Vet. Bull. U.S. Army.* **26.** 246.

This note describes the occurrence of the larvae of *H. lineatum* which were obtained from swellings situated in the neck or back in several army horses at Fort des Moines, Iowa.—J. E.

I. Lindquist, A. W. (1932). *Alysia ridibunda* **Say, Parasitic on Blowfly Larvae.**—*J. Econ. Entomol.* **25.** 415-416. [3 refs.]

II. Abbott, C. E. (1932). **The Proboscis Response of Insects with Special Reference to Blowflies.**—*Ann. Entomol. Soc. America.* **25.** 241-244. [8 refs.]

III. Fuller, Mary E. (1932). **The Larvae of the Australian Sheep Blowflies.**—*Proc. Linn. Soc. New South Wales.* **57.** 77-91. 22 text figs. [10 refs.]

IV. Fuller, Mary E. (1932). **The Blowfly Problem—Notes on the Effect of Carcass Burial.**—*J. Sci. & Indust. Res. Australia.* **5.** 162-164. 3 tables.

I. Specimens of *Alysia ridibunda* emerged from blowfly larvae obtained in New Mexico and Arizona.

II. The proboscis response is defined as an extension of the movable mouth parts of an insect in the presence of certain stimuli. The feeding of mosquitoes is said to be initiated by heat radiation and the biting of *Stomoxys calcitrans* by the odour of perspiration.

The author describes his technique and experiments ; the test substances used were geraniol, cymene, eugenol, and oils of tansy, sassafras, clove, wormseed, aniseed and lemon grass. The most effective stimulating agent proved to be tansy oil, to which 80 per cent. of the flies (*Cynomyia cadaverina*) responded. A similar experiment using *Lucilia sericata* was performed, but with olfactory perception by the antennae excluded by painting with shellac ; 76 per cent. of the flies responded positively to ethyl butyrate (previously determined as having a similar stimulating value to tansy oil). Abbott considers, therefore, that olfactory sense is not confined to the antennae alone, but may be shared by the palpi and labella. He concludes that the response is initiated by one or more stimuli, the more important of which are chemical, that the perception of chemicals is olfactory and that in diptera the nervous mechanism of this response is complete in the head, but that this does not preclude the possibility that the sensory part of the mechanism exists elsewhere.

III. This paper deals with the identification of Australian sheep blowfly larvae ; a key is given for their differentiation and most of the species are described

in detail. The descriptions are of larvae in the third instar, which stage is reached by the end of the second or on the third day on the living animal.

The following species are recorded and arranged in their order of succession on sheep or carrion :—

Primary—*Lucilia cuprina*, *L. sericata*, *Calliphora stygia*, *C. augur* and *C. fallax* : Secondary—*Chrysomyia rufifacies*, *C. micropogon*, *Microcalliphora varipes* and *Sarcophaga* (3 spp.) : Tertiary—*Peronia rostrata*, *Musca hilli* and *Ophyra nigra*.

IV. The author concludes that burial of carcasses favours the primary flies (*Lucilia* and *Calliphora* spp.) and adversely affects the secondary and tertiary ones [*Chrysomyia*, *Microcalliphora* and *Peronia* spp.]. Poisoning of the slashed carcass with a solution of sodium arsenite containing 0·5 per cent. of arsenious oxide, before burial, is efficient in destroying any maggots present in the carcass. The burial of carcasses did not affect the emergence of *Brachymeria calliphorae* [a parasite of blowfly larvae] which, unlike *Mormoniella*, works quite readily under the soil.

—J. S. Steward.

Steward, J. S. (1931). **A Note on Simulium sp. attacking Horses and Cattle in Herefordshire.** *2nd Rep. Direct. Inst. Anim. Path. Univ. Cambridge.* pp. 194-197. [14 refs.]

The writer was prompted by the rarity of veterinary references to *Simulium* attacking animals in Great Britain to record the taking of *S. ornatum* and *S. latipes* from the ears of calves and horses during April. A short description is given of the larvae, pupae and adults, with a brief account of their life history. The breeding place was traced to a stream three-quarters of a mile distant and larvae and pupae were found attached to stones and vegetation in the swiftest parts of the stream.

Notes follow on the recorded distribution of simuliidae in Great Britain and reference is made to the annual losses of cattle and sheep in Central Europe from the bites of these flies, which occur in enormous swarms in the neighbourhood of rivers during April and May. The methods of prevention, control and treatment suggested by continental and American authors are quoted.

Blacklock [(1926). *Ann. Trop. Med. & Parasitol.* **20.** 1.] has shown that *S. damnosum* is the vector of *Onchocerca volvulus* in man. *S. venustum* is suspected to be the vector of *Leucocytozoon anatis* which sometimes causes a serious mortality in ducklings in North America, and an instance is quoted of losses of goslings from the bites of *S. aureum* in New Brunswick and Nova Scotia.

—J. S. Steward.

Hanson, K. B. (1932). **Parasites of Ranch Foxes and their Treatment.**—*J. Amer. Vet. Med. Ass.* **80.** 202-212.

[This paper was presented before the 68th Annual Meeting of the American Veterinary Medical Association].

Of the several points in connection with the occurrence, pathogenicity and control of the various external and internal parasites which are mentioned in the paper and in the report of the subsequent discussion, the following may be given here :—

Lice are rarely found on red foxes, but are not uncommon on blue foxes from the islands off the coast of Alaska. Dipping in 2 per cent. cresol during warm weather is recommended as treatment.

Ear mange is common in ranch foxes, but body mange due to sarcoptes or notoedres, although a common disease of wild foxes, does not give much trouble. This is also true of tapeworms and flukes, which are common in wild foxes but are relatively rare on fox farms. *Toxocara canis* and especially *T. leonina* are

troublesome in cubs, the most susceptible age being from two to four weeks. Those heavily infected thrive badly and not infrequently die. Routine dosing of all cubs at 17 to 25 days old with oil of chenopodium, 0·05 to 0·1 c.c. per kg. or tetrachlorethylene 0·2 c.c. per kg. are recommended.

Hookworms give most trouble at three to six months old, *Uncinaria stenocephala* being the species usually concerned. Treatment is not recommended except in heavy infestations. The lungworm *Eucoleus aerophilus* is the most troublesome parasite, but may be successfully treated by keeping the affected foxes on wire floors and passing the tracheal brush at intervals of one to three weeks. *Capillaria plica* in the bladder is relatively non-pathogenic.

In the course of the discussion C. W. Bower suggested the use of a solution of derris root for ear mange and also reported some losses which he had experienced in the use of tetrachlorethylene as a result of its entering into the lung. In reply the author of the paper expressed the opinion that a dressing for ear mange should contain some ingredient to break up the wax, which a solution of derris would not do. When accidents happen in the use of tetrachlorethylene and some enters the lung the fox should be swung round by the hind legs in an attempt to whirl the drug out of the trachea and artificial respiration be performed.

—E. L. Taylor.

Bryant, J. B. (1932). **County-Wide Eradication of Equine Parasites.**—*J. Amer. Vet. Med. Ass.* **80.** 213-224.

[This paper was presented at the 68th Annual Meeting of the American Veterinary Medical Association].

The author gives a short account of an attempt to eradicate horse bots and horse ascaris. All horses in a certain county were treated with carbon disulphide given in capsules, either as the pure liquid or incorporated in a powder. The author considers that by mixing the drug with a powder the administration is made safer, but the efficiency is reduced and there is a tendency for symptoms of colic to appear. The efficiency of the dose is very variable, partly because of the want of proper co-operation by the horse owners in the matter of dosing.

In the course of the discussion which followed F. H. Kelly, who had been the first to inaugurate an eradication scheme of this kind, said that he thought 40 cents per head a year a reasonable price for treating horses in this way.

L. A. Merillat said that treatment in December and again in February is probably the best way of getting rid of bots. He pointed out that all work on the eradication of parasites is in its pioneer stage.

Frank Havre considered the use of the stomach tube to be the best way of administering carbon disulphide. [The measure of success so far obtained by the eradication scheme does not appear to have been discussed].—E. L. Taylor.

—. (1932). **Applied Helminthology.**—*Brit. Med. J.* Sept. 17th. 566.

[Paper given at the Annual Meeting of the British Association for the Advancement of Science, York, Aug. 31st to Sept. 7th.]

In the symposium on helminthology at the meeting of the British Association at York, Professor Leiper, in discussing the medical aspect of the subject, briefly sketched the history of its development and dealt with some of the principal discoveries which have led up to our present understanding of the means of preventing helminthic disease.

T. W. M. Cameron contributed some remarks on the economic importance of parasitic helminths to domestic animals ; he pointed out that the animal population of Great Britain is now 38 millions and he estimated the annual loss to be

over £10,000,000.

Other contributions to the symposium were made by Dr. Marjorie TRIFFIT on the economic significance of eelworms, Dr. T. SOUTHWELL on the cestodes of marine fishes, Mr. F. J. BROWN on the excretory system of trematodes and Dr. J. N. OLDHAM on helminths as a means of controlling insect pests. Dr. B. G. PETERS outlined the history and aims of the Imperial Bureau of Agricultural Parasitology.—E. L. TAYLOR.

CHANDLER, A. C. (1932). **Susceptibility and Resistance to Helminthic Infestations.**—*J. Parasitol.* **18.** 135-152. 1 chart. [41 refs.]

This paper gives a résumé of our present knowledge of immunity to infestation with parasitic worms ; the literature on the subject is briefly reviewed and a short account is given of the author's experiments on the nature of the immunity response of rats to *Nippostrongylus muris*. In summarizing all the recorded observations the author states that resistance is influenced by species of host, age, diet, vitamin deficiency and previous infection with the parasite. The development of immunity is shown by the failure of the host to acquire more parasites, by the loss of parasites already present and by partial inhibition of reproduction and of development. The immunity is at least partly of a local nature and acquired resistance is highly specific.—E. L. TAYLOR.

LE ROUX, P. L. (1932). **Notes of the more Important Worms of Cattle, Sheep and Pigs in Northern Rhodesia.**—*Ann. Bull. Dept. Anim. Health, N. Rhodesia.* pp. 9-24.

This paper, written in semi-popular language, is of interest in giving some account of the comparative importance of the various species of parasitic worms infesting stock in Northern Rhodesia. Of the trematodes, *Fasciola gigantica* is much more prevalent than *F. hepatica*. Snail control is considered to be impracticable in many parts of the country and repeated dosing with carbon tetrachloride is recommended as the best means of combating the disease—1 c.c. of the drug in 4 c.c. of linseed oil for sheep and 3 to 5 c.c. in 20 c.c. of milk for cattle.

Of the cestodes, *Cysticercus cellulosae* causes the most trouble and leads to severe losses among pigs. *C. bovis* is comparatively scarce. *Stilezia hepatica* is very prevalent but apparently causes little harm ; severe symptoms (sometimes leading to death) are, however, ascribed to infestation with *Moniezia* spp.

Of the nematodes, *Haemonchus contortus* causes considerable trouble, but *Ostertagia circumcincta* appears to be comparatively unimportant. *Trichostrongylus* spp. or " bankrupt worms," as they are called in that part, do damage where sheep are not in good condition. Sheep and cattle suffer severely from hookworms and in the author's experience carbon tetrachloride is a valuable remedy. Nodular worms in sheep are also very injurious and persistent diarrhoea, rapid loss of condition and great weakness are ascribed to their presence.

Unthriftiness, great loss of condition and death are also ascribed to nodular worms in pigs.—E. L. TAYLOR.

MANEGOLD, O. (1931). Ueber Cysticerkose, mit besonderer Berücksichtigung der beim Schwein und Schaf vorkommenden Finnen. [**Cysticercosis, with Particular Reference to that of Pigs and Sheep**].—*Schlachthof- u. Lebensmitüberwach. Suppl. Deuts. tierärztl. Wschr.* Nos. 22, 23 and 24. 85-87, 89-91 and 93-94. 9 figs. [67 refs.]

Returns from the Hanover abattoir over the last 28 years show a decrease in the percentage of measled pigs from 0·05 per cent. to 0·0005 per cent. *Cysticercus*

ovis appears to be commoner than was generally thought and the author refers to various reports of its occurrence. *C. tenuicollis* is the commonest cyst and at Hanover is found in 23 per cent. of pigs and 15 per cent. of sheep. This species may as a rule easily be distinguished from *C. cellulosae* by the different situations in which it is usually found and by its larger size, but this character is liable to considerable variation and, although *C. cellulosae* is comparatively constant in size, *C. tenuicollis* may vary between 0·15 and 430 c.c. in volume. Instances of doubtful determination occur not infrequently in practice where pea-sized *C. tenuicollis* are found under the parietal peritoneum or pleura or in infestations of the liver where either species may be found.

Microscopical examination of the heads enables them to be differentiated by the measurements and numbers of the hooks ; the number is, however, very variable and in the examination of 500 heads of *C. tenuicollis* was found to range between 24 and 48 hooks, the most frequent number being 32.

C. inermis has been reported as occurring in several animals other than cattle ; it has been found in sheep, goats and pigs, and even in man, but most of these reports are probably the result of wrong determinations based on the absence of a rostrum and of hooks, both of which may not infrequently be absent from the cysts of other species.

It is considered that, where there is doubt as to the species of any of these cysts, the material should be forwarded alive to a laboratory for determination.

—E. L. Taylor.

I. Tubangui, M. A. (1932). **Trematode Parasites of Philippine Vertebrates. V. Flukes from Birds.**—*Philippine J. Sci.* **47.** 369-404. 5 text figs., 11 plates, 1 table. [30 refs.]

II. Ameel, D. J. (1932). **Life History of the North American Lung Fluke.**—*J. Parasitol.* **18.** 264-268. 2 figs. [4 refs.]

I. Among the 17 species here described are 14 new species and varieties and 7 from domestic ducks and fowls. These are as follows. *Notocotylus intestinalis*, *N. naviformis*, *Psilochasmus longicirratus*, *Echinoparyphium recurvatum* from the intestine of the domestic duck, *Echinostoma revoltum* from the caecum and *Philophthalmus rizalensis* from the conjunctival sac of the domestic duck, and *P. problematicus* from the conjunctival sac of the domestic fowl. With the exception of *P. longicirratus*, *E. recurvatum* and *E. revoltum* these species are new to science.

II. The author has previously reported the discovery of the cercaria of this fluke [see this *Bulletin*. **2.** 457]. He succeeded in infecting several species of crayfishes and in the present paper gives an account of the cercaria and metacercaria, indicating the differences from the cercaria described by Kobayashi, and the still greater differences from cercaria described by Faust.

Small adult worms are known to remain in the pleural and abdominal cavities of white rats for months without penetrating the lungs. Twelve of these worms, 185 days old, taken from rats, were fed to a cat, and it was later found that six mature worms had developed in the cat's lungs. The mink has been shown to be the true definitive host of this parasite and it is suggested that cats may possibly become infected through eating these animals during the first few weeks of infection.—E. L. Taylor.

Kauzal, G. (1932). **Note on the Treatment of Lung Worm,** *Dictyocaulus filaria* **(Rud., 1809), Infestation of Sheep.**—*Austral. Vet. J.* **7.** 25-28. [4 refs.]

Ten lambs, nine months' old were experimentally infected with *Dictyocaulus*

filaria, each receiving 4,250 larvae. Five weeks afterwards one lamb died and was found to harbour 754 mature worms. The others were treated by intratracheal injection and by insufflation of tetrachlorethylene, carbon tetrachloride and the New South Wales Department of Agriculture remedy. The number of worms found at autopsy varied from 12 to 276 and no conclusion can be drawn on the value of the treatment.—E. L. Taylor.

Tunnicliffe, E. A. (1932). **The Occurrence of** *Cooperia oncophora* **and** *Nematodirus helvetianus* **in Calves.**—*J. Amer. Vet. Med. Ass.* **80.** 250-251.

Fifteen of approximately 500 calves on a certain pasture became emaciated and suffered from a profuse, foetid and more or less bloody diarrhoea. Two of the 15 died and at autopsy showed a haemorrhagic rectal mucous membrane, many coccidia in scrapings from the mucous membrane of the small bowel and a massive infestation of *C. oncophora* and *N. helvetianus*. The remaining 13 calves recovered.—E. L. Taylor.

I. Thomas. (1932). Fütterungsversuche mit trichinösem Fuchsfleisch an Mäusen. [**Feeding Experiments with Trichinous Fox Flesh to Mice**].—*Zschr. Fleisch- u. Milchhyg.* **42.** 398-399. 2 figs. [3 refs.]

II. Keller, L. (1932). Ueber primar verkalkte Trichinen. [**On Primary Calcified Trichinae**].—*Wien. tierärztl. Mschr.* **19.** 492-494. 5 figs.

I. Two white mice were fed with small doses of the spherical or almost spherical cysts of trichinae from fox flesh and on subsequent examination of the muscles of the mice the newly formed cysts were observed to be of a distinctly long oval shape. This observation is at variance with that of Böhm who found the shape of trichinous cysts in mouse flesh to be round or round-oval.

Keller [see this *Bulletin*. **2.** 649.] has expressed the opinion that the shape of the trichinous cyst is determined by the nature of the muscle fibres of the host species. The two mice were in fat condition so the muscle fibres would therefore be open and the author concludes from the observations which he has here recorded that the shape of the cysts is not necessarily dependent upon the kind of animal in which they occur, but upon the consistence of the muscle fibres at the time of infection.

II. The primary calcification of trichinae [i.e. the calcification of the larva prior to calcification of the cyst] is frequently encountered during trichinosis inspection at Graz. The author here reports the observation of primary calcification and of polar calcification [the deposition of calcium normally begins at the poles of the elongated cyst] in the same carcass, and so evenly distributed that the two kinds were often seen together in one field of vision under the microscope.

—E. L. Taylor.

DISEASES, GENERAL.

Carré, H. (1931). Quelques maladies peu connues du Mouton. [**Some Little-Known Diseases of Sheep**].—*Rec. Méd. vét.* **107.** 852-880.

The author first deals with epizootic abortion and points out that this may be due either to *Br. abortus* or to *Br. melitensis*. Cases due to the latter organism have occurred in several parts of France, once with a parallel infection in man. Contagious pustular mucodermatitis, due to a virus and shown to be identical with ecthyma and ulcerative stomatitis, is an ever increasing danger and appears to be especially virulent when sheep are in a low condition, as after lambing. This is a great danger in ewes because mammary lesions may not only infect the lambs,

but the latter may starve because the ewes refuse milk with the result that mammary troubles follow the retention of the milk. When seasonal outbreaks occur, the author recommends vaccination of the ewes two months prior to lambing and of the lambs at birth. Several causes of enteritis in lambs are considered, amongst which are hydrocyanic acid poisoning from oil cakes and enteritis and nephritis due to feeding sugar beet pulp. Lameness in lambs due to an arthritis caused by the bacillus of swine erysipelas occurs occasionally. Four enzootics are described ; pigs were kept in every case. Treatment by serum did not seem to be very successful.—NORMAN HOLE.

DILL, R. (1932). **Three Pathological Conditions affecting Ewes.**—*Vet. Med.* **27.** 26-29.

The author differentiates three separate disease conditions occurring in pregnant ewes, commonly referred to collectively as acidosis. He states that acidosis shown by the presence of acid urine is very common in all sheep diseases particularly in cases where no food has been taken for some time.

The three conditions referred to are blind staggers, preparturient anaemia and pregnancy disease. These conditions are described, but as the symptoms of all three are very similar and there are many points in common it is hardly possible to give a lucid short description illustrating the differences between them. Blind staggers is caused by improper feeding, usually with too dry food and insufficient water, and is seen in sheep of all ages and in both sexes, including pregnant ewes.

Preparturient anaemia occurs in ewes carrying twin lambs and is actually a condition of starvation during the last two weeks of gestation, when the nutritive demands of the embryos are very great.

Pregnancy disease is described by the author as identical with the disease known under the same name elsewhere [see this *Bulletin*. **2.** 22]. Dill states that exercise cures the ewes.

With regard to *post-mortem* findings, sheep which have died of staggers merely show congestion consequent on decubitus prior to death ; sheep which have died of preparturient anaemia show moderate emaciation and those which have died of pregnancy disease show the characteristic fatty liver.—J. E.

MÖLLMANN, L. H. (1932). Zur Pathologie der sympathischen Bauch-ganglien des Pferdes—Ganglion coeliacum plus mesentericum anterius—zugleich ein Beitrag zur Pathogenese der Kolik. [**The Pathology of the Sympathetic Ganglia of the Horse Abdomen—Coeliac and Anterior Mesenteric Ganglia—A Contribution to the Pathogenesis of Colic**].—*Zschr. Veterinärk.* **44.** 273-288. 2 plates. [12 refs.]

It is sought to determine the precise relationship between verminous aneurism of the anterior mesenteric artery and colic. It is considered that such aneurisms rarely, *per se*, produce fatal colic. Even when thrombi become detached and embolisms result colic does not necessarily follow, for the process is sufficiently slow to permit the formation of compensatory anastomoses. It is only when the caecal and colic arteries are blocked suddenly near their origin that true embolic colic is likely to result. The possibilities of larval strongyles producing colic by methods other than embolism are discussed and it is suggested that they may operate (1) by the inflammatory processes which they set up in the anterior mesenteric artery, spreading to the large ganglia, with consequent destruction of nerve tissue and functional derangement and (2) by the larger of the aneurisms which they produce exerting mechanical pressure on the adjacent ganglia and

causing atrophy of sympathetic nerve tissue.

In an attempt to elucidate these points the ganglia of 60 horses were examined histologically. In 36 of these horses considerable aneurisms of the anterior mesenteric artery were found and in 30 of these cases inflammatory changes in the ganglia were noted and are described. Slighter morbid changes of the artery were encountered in the remaining 24 horses and in these the ganglia were involved in 29·6 per cent. of the cases. There thus seems to be a considerable constancy of association between the presence of verminous aneurism and pathological changes in the ganglia. No evidence of parasites or their debris was found in the ganglia, indicating that the lesions therein were due to the spread of the inflammatory processes, or to pressure, and not to actual invasion by the strongyles. The part played by toxins of verminous origin remains conjectural.—A. A. Pryer.

Seekles, L., Sjollema, B., & van der Kaay, F. (1932). Der Einfluss von Gravidität und Geburt auf die Zusammensetzung des Blutserums und auf den Tonus des vegetätiven Nervensystems. [**The Influence of Pregnancy and Calving on the Composition of the Blood Serum and on the Tone of the Vegetative Nervous System**].—*Acta Brevia Neerlandica.* **2.** 202.

Seekles, L., Sjollema, B., & van der Kaay, F. C. (1932). Die Aenderungen in der Blutzusammensetzung und im Tonus des vegetätiven Nervensystems während der Gravidität und in der Geburtsperiode des Rindes. [**The Changes in Blood Composition and in Tone of the Vegetative Nervous System of Cattle during Pregnancy and at the Birth Period**].—*Biochem. Zschr.* **249.** 424-437. 3 tables. [17 refs.]

Two papers which may be abstracted together since the second is an extended version of the first.

Observations on three cows for a few months before calving and a few weeks after showed no significant changes in blood minerals until about the fourth day before parturition.

A small fall in serum calcium and inorganic phosphate then occurred, with minima about the actual time of delivery (magnitude of variations about 2 mg. per cent.). Serum magnesium showed minor changes generally inverse to calcium. Serum potassium showed small variations with minimum about four days after calving.

Diffusible calcium, magnesium and phosphate generally ran parallel with total values, but noteworthy irregularities occurred.

Blood sugar (seven cases) rose during the parturition period and acetone bodies increased markedly. Considerable variations occurred after birth, high acetone being generally associated with low sugar and *vice versa*.

No alteration in non-protein nitrogen occurred.

In one case symptoms of atypical milk fever appeared and were abolished in 1½ hours by injecting parathyroid extract. Of special interest was the fact that this cow showed symptoms of paresis at a period of rising blood calcium and that the total calcium fell slightly after recovery although the ionized portion of the total was almost doubled.

With progress of pregnancy increasing vagus tone was observed, as tested by the Danielopolu adrenalin method. This cardiac hypervagotonia disappeared after parturition, was associated with the K/Ca quotient of the serum but not attributed solely to variations in the potassium-calcium ratio.—H. H. Green.

Sjollema, B. (1932). **Nutritional and Metabolic Disorders in Cattle.**—*Nutrition Abst. & Rev.* **1.** 621-632. [61 refs.]

A review of material much more limited than the title suggests and best treated as a discussion of the bovine metabolic disorders of which the author and his Utrecht colleagues [SEEKLES and VAN DER KAAY] have had most experience.

Although, for instance, disorders of minor importance such as eczema, urticaria, hydraemia, nutritional anaemia, and fagopyrism are briefly mentioned, the fairly well established aferrosis of New Zealand, Kenya and Florida is not [see this *Bulletin*. **1.** 314. and **3.** 40.], while the aphosphorosis so important in the economics of the stock industry of large areas in the Dominions and in America is dismissed without reference to literature [see this *Bulletin*. **2.** 391].

The main subdivisions of the paper deal with ketosis (acetonaemia or aceturia), rickets and osteomalacia, grass tetany [the " lactation tetany " of British writers], and milk fever or parturient paresis.

With regard to rickets and osteomalacia the omission of the British, Dominion, and American literature on bovine aphosphorosis and the debatable deductions drawn from experimental work on laboratory animals, and from the work of MAREK, leave the discussion very one-sided. The statements, on p. 627 for example, that " in most cases of rickets in herbivora the main nutritional factor seems to be that the amount of calcium in the ration is small in comparison to that of phosphorus " and that " in these cases a high level of blood inorganic phosphorus is to be expected," will not find general acceptance [contrast THEILER. this *Bulletin*. **1.** 313, and FITCH, ECKLES, PALMER and co-workers, this *Bulletin*. **2.** 613].

With regard to acetonaemia, acetonuria or ketosis, a disease generally occurring in well-nourished, lactating cows, the author provides a useful summary of existing knowledge much of which is based upon his own researches. The alkaline reserve of affected cows is reduced (even down to 35 " volumes per cent." of carbon dioxide, or about three-fifths of normal), the urine becomes acid with concomitant increase of ammonium salts and appearance of acetone bodies (about 1 g. per 100 c.c.) and acetonaemia is marked (80 to 100 mg. per 100 c.c. blood).

Since the aetiology of acetonaemia is obscure, treatment is based upon symptomatology—200 g. glucose and 100 to 150 units of insulin dissolved in a litre of water and injected in several places.

With regard to milk fever and grass tetany many of the observations are original [compare papers of SJOLLEMA, SEEKLES and VAN DER KAAY abstracted in this *Bulletin*. **3.** 52, 91 and 220.] and therefore of special interest. Symptomatology is discussed in relation to blood changes and physiological explanations are offered where possible.

The ratio of serum calcium to serum magnesium is treated as significant and the figure 2 for milk fever, approaching the figure 1 for magnesium narcosis, is related to the loss of consciousness and muscular atony shown in the disease. In normal serum the quotient Ca/Mg is 5·6. In lactation tetany it is 14, being largely increased by the extraordinarily low values for blood magnesium [compare DRYERRE. (1932). *Vet. Rec.* **12.** 1163].

The aetiology of both diseases is discussed and differential diagnosis explained but owing to obscurity in causation the treatment recommended is based upon the symptomatology.

Despite the difference in character of the two disorders, one a parturient paresis and the other independent of parturition (55 per cent. of the recorded cases occurring more than six weeks after calving), the treatment recommended is the same for both—intravenous injection of 40 g. calcium chloride (crystalline $CaCl_2.6H_20$) and 15 g. magnesium chloride (crystals, $MgCl_2.6H_20$) dissolved in 300 c.c. of water. Good results are reported and the cardiac effects less pronounced than with calcium chloride alone. Udder inflation is of course also practised in

Holland for milk fever and occasionally also for grass tetany.—H. H. Green.

I. Hastings, C. C. (1932). **So-Called Nutritional Anemia of Pigs.**—*Vet. Med.* **27.** 13-15. 1 fig.

II. Fulton, J. S. (1932). **Anemia of Young Pigs.**—*Ibid.* 103-105. 1 table. [4 refs.]

III. Doyle, L. P. (1932). **Anemia in Young Pigs.**—*J. Amer. Vet. Med. Ass.* **80.** 356-360. 6 tables.

I. The author considers that the name anaemia, as applied to the well-known malady of suckling pigs, is extremely misleading. He states that anaemia is only one of several symptoms and that fatty degeneration or obesity would be more appropriate. In his opinion the basic causes of the condition are over-development, lack of proper circulation and auto-intoxication. Fatty degeneration of the liver is a constant feature and is the direct cause of the anaemia, the degree being directly proportional to the amount of parenchymatous tissue involved.

II. A brief summary is given of the views of other writers on this condition. The author also gives particulars of an experiment which led him to the view that access to soil, with or without sunlight, will prevent and cure anaemia among pigs in close confinement. Details of the cellular changes in the blood of young pigs are also given.

III. In this paper, the author points out that the disappointing results, due to anaemia, which so frequently follow the rearing of suckling pigs in barns and hog-houses can be avoided by providing access to blue-grass sod. By means of experiments which he summarizes in tabular form, he shows the superiority of blue-grass sod and, to a lesser degree, rich soil free from sod, to other green foods free from soil. To get the maximum benefit such measures should be adopted within a week of birth.—Gwilym O. Davies.

Harris, L. J. (1932). **The Mode of Action of Vitamin D. The "Parathyroid Theory": Clinical Hypervitaminosis.**—*Lancet.* **222.** 1031-1038. 6 figs. [58 refs.]

An article substantiating a viewpoint already expressed in research papers [see Harris *et alia*, this *Bulletin.* **2.** 564]. Since considerable difference of opinion prevails concerning the mechanism of vitamin D action the concise views expressed may be recapitulated as follows :—

(1) Whatever be the intermediate physiology of vitamin D the characteristic mode of action is to permit an increased "net absorption" of calcium and/or phosphorus from the gut, and a rise in the level of blood calcium and/or phosphorus ["net absorption" in the sense of increase of quantity absorbed by the gut over quantity re-excreted through the gut wall]. Rise of inorganic phosphate automatically brings about increased deposition of calcium phosphate in sites provided with the enzyme phosphatase.

(2) Hypervitaminosis D therefore stands in logical contrast to rickets, which in the human subject is generally due to deficiency of D [compare bovine rickets generally due to phosphorus deficiency—see this *Bulletin.* **1.** 313 and **2.** 391]. In rickets there is a decreased net absorption of calcium and phosphate and hence hypocalcaemia and/or hypophosphataemia. In hypervitaminosis there is a potential hypercalcaemia and/or hyperphosphataemia, with excessive calcification in bony sites and in soft tissues (such as the kidney and aorta) which are richly provided with phosphatase.

(3) This theory of vitamin D action facilitates the explanation of variation between species (e.g. rat as compared with dog or human) and of the aetiology

of experimental tetany as compared with low-phosphate rickets ; also of the influence of Ca/P intake.

(4) The parathyroid hormone can also raise the level of blood calcium but appears to do so by draining the mineral matter from bone rather than by affecting the net absorption from the gut, so that the theory that vitamin D acts by simple stimulation of the parathyroid is not acceptable.

(5) The indiscriminate clinical use of parathormone in cases of suspected calcium deficiency is to be deprecated, especially in cases of infantile tetany, osteomalacia and late rickets ; it may merely aggravate the underlying metabolic error (inadequate mineral retention) and still further deplete the impoverished bones. On the other hand, supply of vitamin D rectifies hypocalcaemia by ensuring adequate utilization of food calcium and/or phosphorus.

(6) Complicating secondary effects occur in experimental hypervitaminosis when maximal levels of toxicity are reached and may lead to misunderstanding. Loss of appetite and failure of gut function may reduce the calcium intake while excretion of calcium remains high, so that retention falls as a whole. If the calcium intake is not increased to correspond with increased D intake, secondary resorptive changes appear in the bones since these are an alternative source of blood calcium.

(7) The ill effects of hypervitaminosis are the same in man as in experimental animals. For the human subject the toxic overdose of irradiated ergosterol is not far removed from the optimal curative dose.—H. H. Green.

Chambers, Helen, & Scott, Gladwys M. (1932). **Immunity to Jensen's Rat Sarcoma Produced by Tumour Extracts.**—*J. Path. & Bact.* **35.** 283-290. 1 fig., 2 tables. [4 refs.]

Bischoff, F., & Maxwell, L. C. (1931). **Hormones in Cancer. II. The Effect of Various Hormone Preparations upon Rat Sarcoma 10 and Hyde Rat Carcinoma.**—*J. Pharmacol. & Exp. Therap.* **42.** 387-399. 1 table. [9 refs.]

Mendeleeff, P. (1932). La non spécificité des substances inhibitrices extraites du sarcome du Cobaye. [**The Non-Specificity of the Inhibitory Substances of the Extracts of Guinea Pig Sarcoma**].—*C. R. Soc. Biol. Paris.* **109.** 49.

Flaks, J. (1932). Sur les métastases du sarcome greffé chez les jeunes Rats. [**The Metastases of Grafted Sarcoma in Young Rats**].—*Ibid.* 255-258. 1 fig., 1 table.

Tuckey, R. E. S. (1932). **Round-Cell Sarcoma in a Heifer.**—*Vet. Rec.* **12.** 218-219. 2 figs.

In the first paper experiments are described which show that Jensen's rat sarcoma deprived of its blood supply and kept at blood temperature undergoes a transitory change during which extracts from it have immunizing properties. These immunizing properties develop for a short time with increasing potency and then disappear. This is apparently due to change in the tumour cells set up by defective oxygenation.

The second paper is a continuation of studies described in an earlier paper [(1929). *J. Pharmacol. & Exp. Therap.* **40.** 97.] in which the effects of adrenal, splenic and ovarian extracts upon the growth of rat sarcoma 10 was described. The effects of adrenalin, pituitrin, parathormone, thyroxin, and the Collip and Ascheim-Zondek gonad-stimulating principles on the rat sarcoma 10 and Hyde rat carcinoma are reported in the present paper.

Sub-lethal doses of adrenalin given subcutaneously failed to affect appreciably the weight-growth curve of the animals or the growth of the tumours. The work of Sugiura and Benedict (1930) is thus confirmed [see Sugiura this *Bulletin.* **2.**

225]. Pharmaceutical doses of thyroxin and of synthalin given daily, appreciably retarded the weight-growth curve without affecting the growth of the tumours. Hypercalcaemia-producing doses of parathormone had no effect upon the rate of tumour growth of the Hyde carcinoma. The gonad-stimulating preparations of the placenta and pregnancy urine and pituitrin had no effect on the rate of tumour growth or incidence of mortality of the R 10 sarcoma or Hyde carcinoma.

The third paper is a brief description of experiments which show that the inhibitory substance recovered from the sarcoma of guinea pigs, precipitated by acid potassium phthalate and redissolved in Locke's solution at pH 8·2, loses its specificity and manifests an inhibitory effect on the tumour growth in mice as well as in guinea pigs.

The fourth paper describes the metastases of sarcomata grafted subcutaneously into the thigh of young rats. Secondary deposits were observed in the abdominal cavity and the lymphatic gland situated in the bifurcation of the abdominal aorta. The structure of the metastases was similar to that of the primary graft.

The fifth paper is a short clinical article recording a case of round-cell sarcoma affecting the cranial, cervical and other lymphatic glands and lungs of a heifer. [No histological details are given and the case cannot be accepted authentically as a malignant metastasizing tumour of this type].—J. R. M. Innes.

IMMUNITY.

Weil, A. J., & Besser, F. (1931). Die antigenen Eigenschaften von Cholesterin, Cholesterinderivaten und synthetischem Lecithin. [**The Antigenic Properties of Cholesterin, Cholesterin Derivatives and Synthetic Lecithin**].—*Klin. Wschr.* **10.** 1941-1944. 5 tables. [19 refs.]

Pure cholesterin and dihydro-cholesterin show antigenic properties of the nature of a haptene. Sera produced with them are of high specificity. Synthetically produced distearyl-lecithin has similar antigenic properties. Its activity *in vitro* is intensified by the addition of cholesterin.

The sera were produced in rabbits by intravenous injection of the respective agents, combined with pig serum, twice weekly over a period of from three to five weeks. Antibody production was measured by complement-fixation.

Anti-cholesterin sera gave no fixation with cholesterin oxide, cholesteryl-acetate, cholesterin-dibromide, commercial lecithin (Merck) or with distearyl-lecithin. Sera for the latter gave no fixation with commercial lecithin or with cholesterinized or not cholesterinized ox-heart extract. Sera for commercial lecithin gave no reaction with the synthetic product, but reacted with cholesterinized heart extract.—A. W. Stableforth.

Ninni, C. (1932). Sur quelques propriétés chimiques, microscopiques et sérologiques des filtrats de voiles de bacille de Koch et de la fléole sur le milieu de Sauton. [**Some Chemical, Microscopic and Serological Properties of Filtrates of Cultures of Koch's Bacillus and of the Timothy Grass Bacillus on Sauton's Medium**].—*Ann. Inst. Pasteur.* **49.** 186-193. [4 refs.]

Filtrates of cultures of Koch's bacillus and of the Timothy grass bacillus give positive reactions for proteins and lipoids. The amount of protein and colloidal substances precipitated by trichloracetic acid, or by alcohol and nitric acid, depends upon the method of preparation of the bacillary suspension, whether it be simply an aqueous suspension or contains salt and also on the time of contact of the organism with the water before filtration. The filtrates are rich in the virus form

of these organisms—as shown by biological tests. Waxes, fats and free lipoids do not pass the filter, the lipoids of the filtrate being in combination with protein. As this filtrable lipoid contains no waxes or free fats it forms a good antigenic preparation, although it is somewhat weak.—W. R. WOOLDRIDGE.

DELAFIELD, M. E. (1932). **A Comparison of the Changes in the Blood Sugar and Blood Phosphorus in Rabbits following the Injection of Suspensions of Different Dead Bacteria.**—*J. Path. & Bact.* **35.** 53-75. 3 tables, 3 charts. [13 refs.]

In a previous paper [(1931). *J. Path. & Bact.* **34.** 177.] it was shown that intravenous injections into rabbits of killed suspensions of *Bact. aertrycke* produced a hyperglycaemia within two hours with a fall in the amount of inorganic blood phosphorus, followed by a hypoglycaemia at 24 hours and a definite rise in inorganic phosphorus above the initial value. These results are extended to many other species of bacteria, viz. Gram-positive :—*Mycobacterium tuberculosis* (human), *M. tuberculosis* (cold-blooded), *Corynebacterium hoffmannii*, *C. xerosis*, *C. diphtheriae*, *Clostridium welchii*, *Staph. aureus*, *B. mesentericus*, *Str. viridans*, *Str. haemolyticus*, *Str. pneumoniae* ; and the following Gram-negative organisms :—*Bact. coli*, *Bact. shigae*, *Bact. typhosum*, *Bact. aertrycke*, *Bact. aerogenes*, *Hemophilus influenzae*, Meningococcus, *Br. bronchiseptica*, *Proteus vulgaris*, *Pasteurella muris*, *Vibrio cholerae* and *Bact. alcaligenes*. In each test three rabbits were used. The suspension of organism was prepared by washing off the growth on solid media in saline and killing the organisms either by ten minutes steaming or by incubating overnight at 37° C. with 1 per cent. of chloroform and removing the latter by evacuation at a water pump. The dose of organism used was 4×10^9 organisms per kilo of animal. Bleedings were made from the ear vein just prior to inoculation, and from the heart at periods of 2, 24 and 48 hours after injection.

Intravenous injections of the dead Gram-positive organisms produced no obvious illness and with the exception of *Str. pneumoniae*, which caused a fall in the organic blood phosphorus, none of the organisms evoked any significant change in the blood sugar or blood phosphorus.

Eight of the 12 Gram-negative organisms tested produced obvious illness of the animal with hyperglycaemias and low inorganic phosphorus at 2 hours after injection, but a lower sugar and a higher phosphorus figure at 24 hours. Two of the Gram-negative organisms produced the chemical response without illness and the other two Gram-negative organisms produced neither illness nor typical response.

Staph. aureus and *Str. viridans* rendered, in part, Gram-negative by long cultivation in broth were inert, as were also bacterial filtrates of these organisms.

High inorganic phosphorus values are always found when the animal is gravely ill at any time subsequent to the first 24 hours after injection. During the first 24 hours there appears to be a correlation between the changes in blood sugar and blood phosphorus.

The significance of the results given above is discussed at some length.

—W. R. WOOLDRIDGE.

I. RAMON, G. (1931). Sur le mode d'action et sur la constitution de la toxine diphtérique. [**The Method of Action and the Constitution of Diphtheria Toxin**].—*C. R. Soc. Biol. Paris.* **108.** 613-615. [3 refs.]

II. RAMON, G., & DEBRÉ, R. (1931). **Value and Duration of Immunity Conferred by Antidiphtheritic Anatoxin. Titration of Antitoxin Present in the Serum of Vaccinated Children.**—*Amer. J. Dis. Child.* **41.** 1-7. [2 refs.]

III. Debré, R., Ramon, G., Mozer, M., Mozer, G., & Prieur, J. (1931). Perfectionnements apportés à la méthode d'immunisation active de la diphtérie par l'anatoxine diphtérique. [**Improvements in the Method of Active Immunization against Diphtheria by Diphtheria Anatoxin**].—*Presse méd.* July 8th. 1032.

IV. Ramon, G. (1932). La méthode d'immunisation active par l'anatoxine diphtérique. Étude critique et comparative. [**Active Immunization by Diphtheria Anatoxin. Critical Study**].—*Bull. Inst. Pasteur.* **30.** 1-16 and 65-75. [70 refs.]

I. The author points out that the terminology and conception of a complex toxin of Ehrlich is not tenable. Bordet has conceived that the union of toxin and antitoxin is by molecules and that each molecule is attenuated to the same degree. It therefore follows that toxin treated with formalin or antitoxin or merely diluted would have the same effect, namely, a dispersal of the molecules of toxin. It is only when toxin is completely transformed by, say, formalin that a new substance is produced. The varying and particular substances named by Erhlich have no foundation and the various phenomena which tended to support his theory are due to the proportion of toxin molecules present compared with those neutralized by antitoxin or altered by formalin.

II. Judged by experiences gained by testing 105 children, it is considered that vaccination with anatoxin permits the immunization of more than 96 per cent. of children, if it be granted that a Schick negative reaction indicates protection from diphtheria. Most of the children received three injections of anatoxin. A minority were still Schick-positive, but a fourth injection after a prolonged interval appears to be successful in immunizing children who fail to react after the usual three. The experiments tended to indicate that the older the child was when vaccinated the higher the percentage of antitoxin in the serum. This may be due to the fact that the number of children presenting Schick-negative results increases with age and that a higher antitoxic content of the serum is obtained by vaccinating children who are Schick-negative than those who are Schick-positive. It appears from the studies that the antitoxin content of the serum of children vaccinated by means of anatoxin does not diminish with time, that is, up to four years, which constituted that period of observations.

III. The authors maintain that, whereas with the usual method of immunization of children with diphtheria anatoxin one may effectively immunize 94 to 96 per cent., it is possible to immunize 100 per cent. and to do so more effectively by increasing the potency and the dose of anatoxin. Three other workers join in the discussion, two expressing the opinion that TAB vaccination carried out in concert with the diphtheria anatoxin gave better results than the latter alone. The third advocated the reinforcement of the third dose of diphtheria anatoxin.

IV. A critical survey concluded by some of the recommendations of a committee of international experts which met in 1931 to consider active immunization against diphtheria. It is concluded that active immunization against diphtheria diminishes the mortality and morbidity amongst the vaccinated. Anatoxin is advocated as being the most efficacious agent and either that or mixtures of toxin-antitoxin are recommended at present, and the need of standardization of all prophylactic vaccines against diphtheria is pointed out. Three injections of the vaccine, subcutaneously and at intervals of about three weeks between the injections, are recommended. The efficacy of the vaccination may be controlled by testing samples of the vaccinated with the Schick test both before and after the injections. It is advisable if possible to vaccinate children before they go to school. Finally,

propaganda in different countries as to the advantage of this method of prophylaxis is advocated.—R. Lovell.

I. Julianelle, L. A., & Rhoads, C. P. (1932). **Reactions of Rabbits to Intracutaneous Injections of Pneumococci and their Products. VII. The Relation of Hypersensitiveness to Lesions in the Lungs of Rabbits Infected with Pneumococci.**—*J. Exp. Med.* **55.** 797-802. [12 refs.]

II. Okischio. (1932). De l'antivirus pneumococcique et de son action sur la virulence du pneumocoque. [**On Pneumococcus Antivirus and its Action on the Virulence of Pneumococci**].—*Ann. Inst. Pasteur.* **48.** 344-348. 4 tables.

I. The first part of these experiments indicated that in rabbits a state of sensitization to foreign proteins, including pneumococcus nucleoprotein, can be induced, with the result that subsequent intratracheal injection of this protein is followed by inflammatory reactions in the lung parenchyma. The fact that this sensitivity may be passively transferred and that it follows both intravenous and intracutaneous inoculations indicate that it is analogous to the heightened skin reactivity previously described, but different from the eye sensitivity previously described.

The second part of the experiments gives no support to the view that lesions in the lungs of rabbits following intravenous injection of pneumococci are modified by any previous state of sensitivity.

II. The author concludes from his experiments that filtrates of pneumococcus cultures put in contact with the same organism exercise an attenuating action, which is the more manifest as the culture from which the filtrate is obtained is older. Antivirus (Besredka) had the most marked action. The action was detectable after contact for three hours at 37° C., but more marked after six hours. Staphylococcus or streptococcus antivirus had little or no effect.

The experiments were carried out by suspending the growth from a 24-hour agar culture of Type I pneumococci in 10 c.c. of glucose broth, filtrate, or antivirus, and injecting one mouse with each of two dilutions. The effects were measured by the duration of survival which in the case of the control was usually 24 to 36 hours and in the case of antivirus, left in contact for 6 hours, usually 84 hours or longer.—A. W. Stableforth.

Scholtz, H. G. (1931). Beeinflussung der Blutbaktericidie durch Mineralsalze. [**Influencing of the Blood Bactericidal Power by Mineral Salts**].—*Klin. Wschr.* **10.** 1569-1570. 2 figs. [13 refs.]

Wolff, L. K. (1931). Ueber Beeinflussung der Blutbaktericidie durch Mineralsalze. [**On the Influencing of the Blood Bactericidal Power by Mineral Salts**].—*Ibid.* 2000. [2 refs.]

By means of Wright's method it was shown that the bactericidal power of the blood of rabbits would be raised by injection of magnesium sulphate. The test organism was a yellow haemolytic staphylococcus and in the untreated rabbit the bactericidal index for this was found to be about 2 and nearly constant. Intramuscular injection of 8 c.c. of a 5 per cent. solution of magnesium sulphate was followed by a two to three-fold increase in the bactericidal power. Similar injections of sodium or potassium chloride or of calcium gluconate were not followed by increased bactericidal power.

In reply to Scholtz, Wolff states that every substance can influence bactericidal power if injected in sufficient amount. He gives, as examples, 0·0001 to 0·001 mg. of histamine, or 200 mg. of sodium chloride intramuscularly; also substances such as serum, colloids and dead bacteria. By the subcutaneous route larger

doses are required and by the intravenous route the following doses :—sodium chloride, 200 mg., potassium chloride, 0·1 mg., calcium chloride, 2·5 mg., and magnesium chloride, 0·01 mg. Anions, e.g. sodium phosphate, sodium bromide and sodium iodide have similar effect (for details see *Zschr. Exp. Med.* (1931). **75.** 710].—A. W. Stableforth.

I. Lusztig, A. (1932). Die Wirkung der Mangansalze auf die Hämolysinbildung. [**The Effect of Manganese on the Production of Haemolysin**].—*Zlb. Bakt. I. (Orig.).* **123.** 376-378.

II. Sládek, J., Parfentjev, I. A., & Sokoloff, B. (1931). **The Influence of Lactic Acid on Hemolysis.**—*J. Pharm. & Exp. Therap.* **43.** 245-250. 4 tables. [2 refs.]

III. Williams, J. W. (1931). **Effects of Triethanolamine on Hemolysis.**—*Proc. Soc. Exp. Biol. New York.* **28.** 926-929. [2 refs.]

I. The author tested the effect of intravenous injection of a solution of manganese chloride into rabbits undergoing immunization with sheep red blood cells. No increase in the production of haemolysin was noticeable in the rabbits so treated.

II. Washed red blood cells of the rabbit were subjected to sodium lactate solutions both alone and in the presence of various dilutions of sodium chloride. It was shown that, whereas sodium lactate at a pH of 7 produced haemolysis at a concentration of about 1 : 200 to 1 : 300, at a pH of 5, haemolysis occurred at a dilution of 1 : 100 to 1 : 200, with a destruction of haemoglobin. With lactic acid alone, instantaneous decomposition appears to take place. In the presence of a hypotonic sodium chloride solution (0·4 per cent. sodium chloride) sodium lactate tends to inhibit haemolytic action.

III. Addition of triethanolamine to suspensions of human red cells in hypotonic solutions of sodium, potassium or calcium chloride tended to increase temporarily the resistance of the red cells to haemolysis. It is considered that it may produce this effect because of its emulsifying action and that it may therefore gradually soften the cell wall before its complete dissolution and haemolysis.

—R. Lovell.

—. (1931). La sieroterapia della febbre ondulante da contagio bovino. [**The Serum Therapy of Undulant Fever of Bovine Origin**].—*Clin. Vet. Milano.* **54.** 812-813.

This short paper is not an original contribution. It briefly summarizes the relationship between undulant fever and infection with *Br. abortus*, and reports references to two cases of infection in human beings treated by anti-melitensis serum. In one case a Czechoslovakian veterinary surgeon who was showing evidence of serious illness, and whose serum gave a positive result to the agglutination test with *Br. abortus* (titre not given), made a rapid recovery after three injections each of 10 c.c. In the second case the patient's titre was 1 : 400 against *Br. melitensis* and *Br. abortus*; blood culture was negative. Although it is not specifically so stated, it is to be inferred that three injections of serum effected a cure.

—A. Leslie Sheather.

Valtis, J., & van Deinse, F. (1932). Sur l'obtention d'un sérum de Cheval anti-filtrat tuberculeux par inoculation intraveineuse de filtrats de voiles jeunes du Bacille de Koch. [**Preparation of an Anti-Tuberculosis Filtrate Serum from a Horse by the Intravenous Inoculation of Young Surface Growths of Tubercle Bacilli**].—*C. R. Soc. Biol. Paris.* **110.** 10-12.

The authors prepared an antiserum against filtrates of tubercle bacilli by the intravenous inoculation of a horse with filtrates of five to eight day old surface growths of bovine tubercle bacilli on Sauton medium. The horse serum, when placed in contact with filtrate of tubercle bacilli, caused an immediate flocculation, visible to the naked eye, which persisted after 24 hours in the incubator. The serum in the early stages of its preparation caused no flocculation with a 1 : 20 dilution of tuberculin, but after five injections of filtrate had been given it caused a slight, transient flocculation with the diluted tuberculin.

The injections of filtrate were suspended for three and a half months, at the end of which period the horse serum had lost its flocculating power for both the filtrate and the tuberculin.—T. M. Doyle.

Leavell, H. R., & Amoss, H. L. (1931). **The Endermic Reaction in Brucella Infections.**—*Arch. intern. Med.* **48.** 1192-1197. 2 tables. [21 refs.]

The authors review briefly the researches which have been carried out on endermic reactions in brucella infections [most of the references deal with *Br. melitensis*].

They carried out intracutaneous tests on nine patients affected with undulant fever and on 51 other persons, 12 of whom were normal. Eight of the nine undulant fever cases were proved bacteriologically to be infected. Twenty-two different preparations of antigen were used, but only 14 of these were used on a sufficient scale to permit of conclusions. So numerous were the false positive reactions obtained with filtrates of broth cultures that the use of this antigen was discontinued. Diluted saline suspensions and saline extracts of brucella gave the best results. The saline extracts were prepared by shaking a suspension of brucella in a machine for 48 hours and then centrifuging it for one hour.

The authors conclude that the endermic reaction is of value in the diagnosis of undulant fever, particularly in those cases where serological and cultural tests are negative. The intracutaneous test is not specific ; cases of undulant fever generally give a positive reaction, but so do a considerable number of negative controls.—T. M. Doyle.

Hart, P. D. (1932). **The Value of Tuberculin Tests in Man, with Special Reference to the Intracutaneous Test.**—*Med. Res. Council Spec. Rep. Ser.* No. 164. pp. 133. [6½ pp. refs.] London : H.M. Stat. Office. [2s.].

A report on the use of tuberculin as a diagnostic agent in the human subject. The reactions of 1,030 clinically tuberculous patients of all ages and suffering from various types of the disease were compared with those of 751 clinically non-tuberculous subjects. The intracutaneous test is recommended as yielding more delicate results than the cutaneous method of von Pirquet or the subcutaneous test. The tuberculin was put up in dilutions of 1 : 10,000, 1 : 100 and 1 : 10, and 0·1 c.c. of each was injected intracutaneously. The reactions were recorded by measuring the degree of erythema on the second and third days respectively. The average minimum error of the test in negative diagnosis was about 2 per cent.

It is suggested that a positive response in very young children indicated progressive tuberculosis. In older subjects, a positive tuberculin reaction to the higher dilutions, particularly to the 1 : 10,000, provided strong evidence of clinical disease ; reactions to the lower dilutions merely indicated that the individual had at some time been infected with the tubercle bacillus.

A large section of the report is concerned with the value of the test in determining the distribution of tuberculous infection in different sections of the community. A comprehensive bibliography containing over 400 references is also appended.

—R. E. Glover.

Shwartzman, G. (1932). **Spontaneous and Acquired Active Immunity to the Phenomenon of Local Skin Reactivity to Bacterial Filtrates.**—*J. Exp. Med.* **55.** 889-902. 1 table. [12 refs.]

Spontaneous active immunity to the phenomenon of local skin reactivity to bacterial filtrates has been demonstrated. In one experiment the immunity was non-specific, in others it appeared limited to one or two bacterial species. Intradermal vaccination of rabbits with bacterial filtrates induced active immunity to the phenomenon. Combined intradermal and intravenous immunization of animals which had previously been grouped according to susceptibility elicited two types of response :—a specific immunity, in rabbits sensitive to one reacting unit, and a non-specific immunity, in rabbits which had a partial spontaneous immunity as shown by absence of reaction to one unit, but reaction to 15 units one week later. Comparative studies of the reacting potency of " agar washings " and disintegrates prepared by freezing and thawing showed that the first washings of bacterial cells are considerably stronger than subsequent washings and disintegrates. These facts are believed to demonstrate further the extracellular nature of the material necessary for the phenomenon.

Tentative explanations of the mechanisms involved in the specific and non-specific immunity to the phenomenon are discussed.—A. W. Stableforth.

Stylianopoulos, M., & Ananiadès, B. (1932). Traumatismes et désensibilisation allergique des Cobayes tuberculeux. [**The Desensitization of Tuberculous Guinea Pigs by Traumatic Shock**].—*C. R. Soc. Biol. Paris.* **110.** 910-912. [1 ref.]

Previous experiments on the effect of blockade of the reticulo-endothelial system on the intradermal tuberculin reaction in tuberculous guinea pigs have given inconstant results. In some cases the response has been equal in intensity to that of a preblocking injection, while in others it has been definitely attenuated.

In these experiments, a series of guinea pigs was inoculated intravenously with Chinese ink (reticulo-endothelial blockade), a killed emulsion of staphylococci and normal saline solution respectively. In each group, subsequent reactions to tuberculin were fully positive in some animals, but were much diminished in intensity in others. It is concluded that the attenuation of the reactions was due solely to the traumatism caused by the inoculation.—R. E. Glover.

I. Saenz, A. (1932). Fixité des propriétés allergisantes du vaccin BCG. [**The Constancy of the Allergic Properties of BCG**].—*C. R. Soc. Biol. Paris.* **110.** 880-883. [1 ref.]

II. Grasset, E. (1932). Propriétés des sérums des Chèvres et des Moutons soumis à des injections repétées de filtrat de culture de BCG, seul ou accompagné de culture de BCG. [**Properties of the Sera of Goats and Sheep after Repeated Inoculations of Culture Filtrates of BCG, either Alone or with Cultures of BCG**].—*Ibid.* 1228-1230. [1 ref.]

I. Saenz compared the allergic properties for guinea pigs of three strains of BCG. One strain (No. 424) was in current use for the preparation of vaccine at the Pasteur Institute, while the other two strains were about five years old and had been sent originally to Oslo and Sweden respectively by the Pasteur Institute.

In order to obtain comparable results the author recommends the employment of guinea pigs with white skins and weighing from 500 to 550 g. Each strain was tested by inoculation of five series of four guinea pigs with falling doses of 1·0 mg. to 0·0001 mg. These guinea pigs were subjected after varying intervals to the intradermal inoculation of 0·1 c.c. of concentrated tuberculin diluted to

one tenth of its volume. It was shown that each of the three strains of BCG, even in small doses, caused allergic reactions with the same regularity and with the same intensity.

The author concludes therefore that the two five-year-old strains have not undergone any modification or variation in their biological characters.

II. The object of this work was to ascertain :—(1) the effects on the humoral reactions of the sera of animals repeatedly injected with the toxic derivatives of BCG ; (2) if the protection conferred by BCG could be strengthened by this means and (3) if the sera of animals so treated would exercise any influence on the evolution of artificially induced tuberculous infection.

Three groups of animals, each comprising two sheep and one goat, were inoculated as follows :—the first group received 10 cg. of BCG intravenously and in addition 20 c.c. of culture filtrate of BCG on the same day ; the second group was given two intravenous injections of 20 c.c. of BCG filtrate, and the third group received an intravenous injection of 10 cg. of BCG. With the sera obtained from these animals comparative serological tests were carried out with the soluble toxic derivatives of BCG and with those of a bovine strain of the tubercle bacillus. The sera obtained from Group 3 gave an opalescence in certain tubes followed by a precipitation ; in Group 2 this opalescence was more rapid and extended to 1 : 800 ; in Group 1 the opalescence reached 1 : 1,500 with the goat serum and from 1 : 250 to 1 : 400 with sheep sera.

[This article should be studied in the original as it contains a mass of detail which does not lend itself to abstraction].—T. M. Doyle.

Gibson, H. J. (1932). **Natural Agglutinins and their Relationship to the Somatic and Flagellar Antigens of Bacteria.**—*J. Immunol.* **22.** 211-227. 12 tables. [9 refs.]

Continuing his earlier work on natural agglutinins [(1930). *J. Hyg. Cambridge.* **30.** 337.] Gibson confirms the work of other authors in showing that the serum of normal animals contains agglutinins for both H and O antigens of several bacterial species. The normal animals examined were the ox, pig, horse, sheep, guinea pig, rabbit and cat and also human beings. He concludes by absorption experiments that the specificity of natural agglutinins depends chiefly on the H component, although an additional non-specific factor which is absorbed by a non-specific agent such as charcoal appears to be involved. He finds that the O agglutinins possess affinities for antigens other than those generally recognized and that their specificity is not so well marked with normal as with immune sera. As with immune sera, O agglutinins were found to be more heat-labile than H agglutinins.
—R. Lovell.

Kfouri, P. (1931). Recherches sur la sensibilité broncho-pulmonaire du cheval au pneumo-bacille de Friedlander d'origine humaine. Reproduction expérimentale de la pneumonie lobaire. [**The Pulmonary Sensitivity of the Horse to Friedländer's Pneumobacillus of Human Origin. Experimental Reproduction of Lobar Pneumonia**].—*Presse méd.* Aug. 5th. 1171. [Paper presented to the Society of Comparative Pathology, Paris, June 9th, 1931].

Research work is stated to have shown that Friedländer's pneumobacillus of human origin is pathogenic for normal horses, a primary injection into the lung producing an acute and fatal lobar pneumonia accompanied by pleurisy. It is further maintained that the effect may be modified if the test animal has recently suffered from a pulmonary infection of pneumococci or enterococci, an injection

of Friedländer's bacilli in this case producing a milder illness. The effect is still more modified if the animal has just previously suffered and recovered from a pneumonia due to Friedländer's bacillus, although this resistance, which is evidently thought to be a local reaction, appears to be limited for a period of about 30 days. [It is unfortunate that details of the experiments were not included as it is impossible to assess the value of the observations].—R. Lovell.

Koch, F. E., & Krämer, Elisabeth. (1932). Ueber den Antagonismus von Colibakterien gegen Typhusbakterien, Staphylokokken und Streptokokken. Untersuchungen in vitro. [**The Antagonism of** *Bact. coli* **for** *Bact. typhosum*, **Staphylococci and Streptococci.** *In vitro* **Experiments**].—*Zlb. Bakt. I. (Orig.).* **123.** 308-318. 4 figs., 1 table. [32 refs.]

The authors examined 108 strains of *Bact. coli* (96 of human origin and 12 of mouse origin) for any antagonistic action against *Bact. typhosum*, *Bact. paratyphosum* B or *Bact. aertrycke*. Mixtures of a strain of *Bact. coli* and one of the typhoid-paratyphoid group were made. In many cases a difference in the proportion of the two types of organisms was apparent on plating out the mixed culture. Four of the human *coli* strains (4·1 per cent.) and five of the mouse strains (42 per cent.) proved to be definitely antagonistic. In addition to a table giving an " antagonistic index " of the various strains, curves are drawn showing that in some cases, even after only five hours, all or nearly all typhoid bacilli have disappeared, whilst in other cases it would appear as if the typhoid bacilli have increased proportionately more rapidly than *Bact. coli*. A similar antagonism between certain strains of *Bact. coli* and staphylococci and streptococci existed.

It is pointed out that if in a mixed culture a long time has elapsed before examination and then no typhoid bacilli are apparent, a re-examination of the specimen should be carried out. [Topley and Fielden—(1922). *Lancet.* **203.** 1164—showed that if a mixed culture from faeces was plated out at intervals, then the dominant species of bacteria seemed to predominate at particular times, one type following another in an orderly manner and they suggested this method for the isolation of any particular species of bacterium from a complex mixed flora]. —R. Lovell.

PHYSIOLOGY.

Thomson, D. L., & Collip, J. B. (1932). **The Parathyroid Glands.**—*Physiol. Rev.* **12.** 309-383. [543 refs.]

This paper forms a comprehensive critical survey of calcium and phosphorus metabolism. Its scope is much larger than that indicated by the title. Intramuscular injection of parathyroid extract in the dog gives an increase in serum calcium, a slight increase of potassium and magnesium and either an increase or a decrease in phosphorus. Diuresis is also produced, and there may be a lowering of the alkali reserve. Intravenous injection gives a more rapid rise in the serum calcium, but only to half the extent. Injection into the cerebrospinal fluid is equally effective, thus differing from insulin. Repeated injections lead to a dehydration of the blood, the chloride content diminishing simultaneously. Oral administration gives very irregular results. In the sheep and goat, tetany is comparatively rare. Clinical improvement has been noted in the use of parathyroid extract in cases of nephrosis in the dog. With the low serum protein present in these cases, it is difficult to raise the serum calcium. Implantation of additional parathyroids in swine gave a lowering of serum calcium and clinical improvement in cases of osteitis fibrosa.

The opinion is expressed that the amount of non-diffusible calcium in serum depends upon the total amount of calcium, the amount of serum protein, and the pH. Parathyroidectomy, they believe, leads to a decrease in some special undissociated calcium compound, which in turn leads to a decrease (relatively less) in ionized calcium and thus tetany is produced. Attention is drawn to the general similarity in effects between large doses of vitamin D, and of parathyroid extract. Injection of the latter, however, does not appear to increase the absorption of calcium from the intestine. In the hen, the blood calcium reaches a peak of 25·6 mg. per cent. before the egg is fully developed. This is accompanied by histological changes in the parathyroids.

The effect of other endocrines upon the calcium-phosphorus balance is discussed, as is also the preparation and standardization of parathyroid extracts.

—Henry Dryerre.

I. Forbes, E. B., Braman, Winifred W., Kriss, M., Swift, R. W., Miller, R. C., French, R. B., Letonoff, T. V., & Sharpless, G. R. (1931). **The Fasting Metabolism of Cattle as a Base Value of Heat Production in the Determination of the Net Energy of Feeding Stuffs.**—*J. Agric. Res.* **43.** 1003-1014. 2 figs., 6 tables. [9 refs.]

II. Forbes, E. B., Braman, Winifred W., Kriss, M., Swift, R. W., Miller, R. C., French, R. B., Letonoff, T. V., & Sharpless, G. R. (1931). **The Metabolisable Energy and Net Energy Values of Corn Meal when fed Exclusively and in Combination with Alfalfa Hay.**—*Ibid.* 1015-1026. 13 tables. [4 refs.]

The interest of these papers to veterinarians lies in the conceptions of the Pennsylvania nutrition workers and in their results rather than in their technique, and abstracting may therefore be concentrated upon the theoretical principles.

It may be recalled that in American usage the term " net energy " of a food, i.e. that portion which is useful to the animal for production purposes, is expressed in heat units [therms in the case of large animals, one therm being 10^3 large calories or 10^6 small calories] and in significance corresponds roughly, but not precisely, to Kellner's " Starch equivalent " as used in Germany and Britain [for discussion of relative values see Wood, T. B. " Animal Nutrition." London : W. B. Clive. 2nd edition. pp. 144-148].

" Metabolizable energy " is of course the " gross energy " of the food, as determined by combustion, minus the energy lost in the excreta, and represents the digestible portion. To obtain the " net energy " for productive purposes there must be further deducted the energy which is unavoidably expended, directly or indirectly, as a result of mere food utilization [digestion, specific dynamic effects, etc.] and which can therefore serve no purpose other than keeping the animal warm.

This last factor " energy of food utilization " is called the " heat increment " and represents an exceedingly complex physiological phenomenon. As related to feeds for cattle it has not yet been quantitatively analysed ; nor has the method of measuring heat increments been thoroughly established.

I. In this paper " base values " of heat production are defined with reference to a curve established at the Pennsylvania Institute of Animal Nutrition, and reproduced in the text. Discussion revolves round : (1) Armsby's computed maintenance energy ; (2) basal metabolism in the usual sense ; (3) hypothetical minimum heat production ; (4) heat production of true fast ; (5) heat production of maintenance and (6) heat production of " twice maintenance."

In the experiments two steers were subjected to three and four fasts, of three

to six days duration, at intervals of four to six weeks, and heat production was measured by direct calorimetry checked by the respiratory-quotient procedure. The tabulated data are corrected to " standard days of 12 hours standing and 12 hours in the lying position."

It was found that heat production diminished continuously as the fast progressed and no definite constant level was reached. If, as the authors propose, the heat production of the first 24 hours after attainment of the respiratory quotient of fat is taken for routine measurement of fast, then " true fast " is attained between the second and fourth day after withdrawal of food.

II. In this second paper the metabolizable energy, heat increment and net energy values of maize and alfalfa hay were determined separately, and in combination, on steers.

The metabolizable energy of maize was found to be essentially the same whether fed alone or in combination, but its heat increment value was found to be much greater when fed by itself than when fed in the mixed ration. From this it follows that the net energy value of a feeding stuff may be affected by the proportion of the ration which it constitutes, and support is provided for the view of Forbes that the determination of consistent energy values would require the presence of all nutrients, except such as serve for energy production, in optimum proportions.—H. H. Green.

Hill, A. V. (1932). **The Revolution in Muscle Physiology.**—*Physiol. Rev.* **12.** 56-67. [37 refs.]

The " revolution " is recorded as having broken out when Eggleton and Eggleton [(1927). *Biochem. J.* **21.** 190.] described a labile form of organic phosphate in muscle. The author [himself a pioneer in the researches reviewed] provides an entertaining history of the subsequent excitement.

The review is of primary interest to specialized physiologists and biochemists, but the following facts may be picked out for general consumption :—

(1) Phosphagen, the labile phosphate, is a compound which, on stimulation of mammalian muscle, breaks down into creatine and phosphate (or into arginine and phosphate in the case of crustacean muscle). This break-down occurs under oxygen-free conditions and is the primary change by which energy is set free. It is accompanied by increased acid-combining power of the tissue.

(2) During contraction and relaxation, and during the ensuing few minutes, lactic acid is set free. The magnitude of the thermal changes at each stage depends partly upon the accompanying pH changes which, for instance, are different in fresh and in fatigued muscle.

(3) During the " anaerobic recovery phase " phosphagen is restored by an endothermic process masked by exothermic production of lactic acid. The energy liberated by delayed lactic acid formation allows resynthesis of the phosphagen, a process which does not occur if formation of lactic acid is impossible as is the case in a carbohydrate-free muscle or in one poisoned with iodo-acetic acid.

The " delayed anaerobic heat," so difficult to explain in earlier experiments on the energy exchanges of isolated muscular tissue, is the resultant of the exothermic reactions of lactic acid formation and protein unionization, and the endothermic reactions of phosphagen resynthesis and protein ionization.

(4) In a muscle supplied with oxygen the same events occur accompanied, however, by oxidative recovery. Only part of the phosphagen broken down is restored anaerobically at the expense of delayed lactic acid formation, the rest being reinstated before the main part of the lactic acid is dealt with. The " recovery heat " represents the excess of energy liberated by oxidation, over and above that

required for resynthesis of phosphagen and glycogen.

(5) Although the " coming of phosphagen " has revolutionized the fundamental outlook in muscle physiology and eclipsed the earlier views on the thermodynamical significance of lactic acid, it has not in the least affected the results of experiments relating mechanical work to oxygen consumption. Only the manner of expression is affected—a consoling fact for those whose main interest lies in the efficiency relationships of working muscle.

[The veterinarian may find added interest in the newer knowledge in view of the possibility that it may assist in throwing further light upon the pathological physiology of conditions such as so-called equine azoturia, see haemoglobinaemia paralytica, this *Bulletin*. **1.** 234].—H. H. Green.

PUBLIC HEALTH.

I. Rinses, J. (1931). Enkele opmerkingen over de destructie van afgekeurd vleesch. [**Destruction of Condemned Meat**].—*Tijdschr. Diergeneesk.* **58.** 1292-1295.

II. Hassel, B. (1932). De verwerking van cadavers en dierlijk afval, van een modern standpunt. [**The Utilization of Carcasses and Animal Offal from a Modern Standpoint**].—*Ibid.* **59.** 351-355. 2 tables.

III. Tenhaeff, C. (1932). De destructie van afgekeurd vleesch en van vleeschwaren. [**Destruction of Condemned Meat and Meat Products**].—*Ibid.* 356-370. [5 refs.]

IV. Tervoert, F. W. (1932). Gemeentelijk Destructiebedrijf der gemeente Winterswijk. [**Municipal Destruction Works at Winterswijk**].—*Ibid.* 503-512. 4 tables.

V. Rinses, J. (1932). Nog enkele opmerkingen over de destructie van afgekeurd vleesch. [**Further Remarks on the Destruction of Condemned Meat**].—*Ibid.* 560-565. [2 refs.]

I, III, & V. These articles are concerned with a discussion of the relative merits of schemes for the disposal of unsound meat by local authorities or by private firms, and the size of area suitable to be included in such schemes.

II. Describes a more up to date method of dealing with carcasses and offal than the former defective " wet " and " dry " systems, namely, the " extraction " process, now in use at Wageningen. It is claimed that it is more economical, more certain in its results and without danger of fire or explosion. No benzene odour remains in the extract, which possesses higher food value, and the fat is whiter and of greater saponifying value.

IV. Tervoert states that the " extraction " process also has certain defects. The meat-meal has too low a proportion of fat, has a slight odour and it is doubtful whether it is absolutely sterile. He describes the new process established at Winterswijk, i.e. the " dry-rendering " process, as being free from such defects. The condemned carcasses and offal are placed in a double boiler heated up to 140° C. by steam introduced between the outer and inner jackets. No moisture enters the inner chamber, but the steam from the fluids in the material itself exerts sufficient pressure, with the help of revolving beaters, to break it down. The steam thus generated is then extracted and takes with it all odours, leaving meal and fat. These are separated by pouring off the fat and centrifuging the meal to reduce its fat content to the required amount. It is claimed that, apart from fluids, 100 per cent. of the material is rendered useful, and no food value lost ; the whole of the albumen, salts, etc. remain ; all organisms are killed ; the

end products are odourless. The process is completed in from three and a half to five hours, the installation is simple, durable and economical. The apparatus described is the Iwel-Laabs, made by the Industrial Waste Eliminators, Ltd., London.—F. Bullock.

Rennes, N. (1932). Inspection des viandes. [**Meat Inspection**].—*Rec. Méd. vét.* **108.** 226-229.

The author is of the opinion that all private slaughterhouses in France should be closed and replaced by public abattoirs, not necessarily municipal but industrial, not only in the interests of public hygiene, including better meat inspection, but in those of the breeders of animals and meat traders generally. The objection so often raised by butchers that these abattoirs are too far from their shops is now eliminated by road motor transport of live animals, meat and by-products.

Dealing with meat inspection, he states that the number of mayors who refuse or neglect to arrange for the examination of meat intended for human food is gradually becoming less. He then discusses the powers given by the laws of 1905 and 1919, the appointment of part time veterinary surgeons at a fixed sum per visit and finally advocates that, as is now being done in England, full time veterinary officers should be appointed with all the necessary powers making it compulsory, not optional, to control the meat, milk, markets and livestock in general in the department allocated to him.

After discussing whether these appointments should be made by municipal local authorities or by the State he writes :—" As regards the municipal meat inspection organization of to-day, it is not perfect. The state institutions are more efficient and would pay their officers better."

It appears, therefore, that he favours such appointment of full time veterinary public health officers.—T. Dunlop Young.

Lachenschmid, B. (1931). Tierarzt und Paratyphus. [**The Veterinary Surgeon and Paratyphoid**].—*Deuts. tierärztl. Wschr.* **39.** 764-769.

Paratyphoid cases in men, due to meat poisoning, have increased in Germany from 821 in 1929 to 925 in 1930, whilst the cases due to Schottmüller infection declined from 4,075 to 3,120. The veterinary side of the question has been neglected and reasons are given why the profession should interest itself in the disease. The living animal is its source and in it the disease runs a longer course and its diagnosis and control are not difficult. An efficient veterinary examination of all meat and meat products could quickly reduce the incidence of the disease in man.

—F. Bullock.

I. Schmidt, W. (1931). Tierärztliche Erfahrungen bei der Einführung der amtlichen Milchüberwachung der Landwirtschaftskammer für die Provinz Sachsen. [**Veterinary Experiences in Introducing Official Milk Inspection by the Chamber of Agriculture for Saxony**].—*Zschr. Fleisch- u. Milchhyg.* **41.** 273-277. [1 ref.]

II. Reich. (1932). Erfahrungen bei der Durchführung der tierärztlichen Milchkontrolle. [**Experiences in the Carrying-Out of Veterinary Milk Control**].—*Berl. tierärztl. Wschr.* **48.** 26-28.

III. Müller, J. (1932). Erfahrungen bei der Durchführung der tierärztlichen Milchkontrolle. [**Experiences in the Carrying-Out of Veterinary Milk Control.**—*Ibid.* 219-220.

I. A report on the experiences of a year's work of the new milk law in Saxony, showing how the work was organized and giving examples of the way in which the

collaboration of veterinary officers and research institutes with dairy farmers tends to the benefit both of the public and the milk producer.

II & III. Reich and Müller discuss the best method of carrying out the provisions of the Milk Act, e.g. whether a rigid plan of taking udder samples at a stipulated time, irrespective of the local hours of milking, is practicable. Müller thinks that first milk drawn is more reliable than the strippings for indications of infection of the milk glands. Reich believes, contrary to Müller, that even after exhaustive milking a quantity of milk can yet be drawn sufficient and suitable for laboratory samples. Both aim at getting the most reliable samples with the least trouble to the farmer.—F. Bullock.

Sutherland, H. (1932). **Tuberculosis and the Milk Supply.**—*Brit. Med. J.* July 23rd. 175.

Sutherland, in a letter to the editor referring to the remarks of Lord Dawson at the Mansion House on July 11th, points out the difficulties involved in any scheme for the elimination of tuberculosis from our herds, especially as regards the proper isolation of reactors from non-reactors both in buildings and pastures.

He advocates pasteurization of milk for infants, but states "It may well be that adults are immunised by small doses of living tubercle bacilli in milk, and that it would be a retrograde measure to produce a virgin soil for the tubercle bacillus."

—D. S. Rabagliati.

—. (1931). **Septic Sore Throat.**—*Ann. Rep. Dept. Health Canada 1930.* pp. 19-27 and 70. 5 tables, 4 charts.

During November and December, 1930 an epidemic of septic sore throat occurred at Kirkland Lake, a town of 8,000 inhabitants. It was traced to infection of the milk of one dairy by a single cow. There were 470 cases and 6 deaths. The first cases were observed on November 7th and from this date forward cases occurred with increasing frequency until December 7th, when 42 cases were reported. In the following week 189 cases developed and on December 12th all local milk supplies were prohibited. Three days later a marked decrease was noted. A smaller number of cases continued to be reported throughout December and a few also occurred in January, but these were attributed to contact infection. The symptoms, of which details are given, included in most cases sore throat, fever and severe cervical adenitis. No cases occurred in houses in which canned milk was used. There was no evidence of any protection resulting from a previous attack of scarlet fever.

The data showed that 87·5 per cent. of the total cases were on the route of one dairy (B) which supplied 35·7 per cent. of families. A bacteriological examination of milk from the cows of this dairy showed that one animal was excreting β haemolytic streptococci which were indistinguishable from the strains isolated from the throats of affected persons: all these strains failed to split sodium hippurate, did not depress the pH of glucose broth below 5·0 to 5·2 and were pathogenic for mice.

At the beginning of the investigation β haemolytic streptococci were obtained from a milker and from a bottler at this dairy. The latter of these workers had suffered from a sore throat before the outbreak, and the strain isolated from her throat is called *Streptococcus epidemicus* and is presumed to have been the origin of the outbreak; details of its characters are not given. It is noted that scarlet fever had occurred in the household of the owner of the dairy a short time before the outbreak.

A small percentage of cases also occurred on the routes of three other dairies,

but in each instance were traced to admixture of milk from the dairy (B). There was no illness amongst the families or workers connected with any of these dairies and samples from cows belonging to them showed only streptococci of bovine nature.—A. W. Stableforth.

POISONS AND POISONING.

Stoddart, W. O., Riddell, A. R., & Bulmer, F. M. R. (1932). **Arsenic as a Potential Hazard for the Farmer.**—*Canad. Med. Ass. J.* **27.** 264-266. [3 refs.]

The authors give clinical details of two cases of subacute poisoning of man, one by arsenic and the other by lead arsenate, and draw attention to the risk commonly run by farmers in their use and storage of arsenical preparations such as dips, weed-killers and sprays.

Emphasis is laid on the great diagnostic value of a test of the hair, particularly the pubic hair, for arsenic. According to the authors' results, pubic hair from a subject not exposed to arsenic may amount to from 15 to 45 parts, after exposure without clinical manifestations to from 174 to 191 parts and after actual display of symptoms to from 357 to 1,337 parts of arsenic per million respectively.

A relatively high proportion observed about three months after dosage is held to confirm an otherwise obscure diagnosis of arsenical poisoning.—G. D. Lander.

THERAPEUTICS.

Bozicevich, J., & Underwood, P. C. (1932). **Critical Experiments with Solid Carbon Disulphide Capsules for the Treatment of *Gastrophilus* spp. in the Horse.**—*Vet. Med.* **27.** 360-364. 1 plate, 3 tables. [5 refs.]

Whilst the effectiveness of liquid carbon disulphide for the removal of horse bots had been determined previously, certain disadvantages were apparent in its administration in capsule form or by the stomach tube. With the former, the danger of inhalation of the drug when the capsules were broken in the mouth was always present. The latter took too much time where large numbers of animals were being treated. If carbon disulphide adsorbed with magnesium carbonate could be given in the form of a solid capsule, without loss of efficiency, these disadvantages would be overcome. The experiments under consideration thus aimed at determining the comparative efficacy of such capsules with liquid carbon disulphide. Critical tests were conducted on seven horses with capsules each said to contain six fluid drams of carbon disulphide adsorbed on magnesium carbonate, administered at the rate of one capsule or more per 1,000 pounds of body weight. Four of the animals were found to harbour no bots. In the other three animals, the treatment resulted in respective efficacies against bots of 94·4 per cent., 60 per cent. and 94·1 per cent.

It was found, however, that solid carbon disulphide capsules become brittle with age and crack. Over a period of 11 months there was a marked loss of weight in such capsules due to decomposition of carbon disulphide and the escape of hydrogen sulphide, the presence of which was indicated by the lead acetate test. The efficacy of fresh solid carbon disulphide capsules for bots is inferior to that of liquid carbon disulphide and the liquid drug should be the preparation of choice for the treatment of *Gastrophilus* spp. in the horse. Care should be taken to see that the capsules used are still flexible and not brittle.—A. A. Pryer.

I. Sjollema, B., Seekles, L., & van der Kaay, F. (1931). Antagonistische Herzwirkung van Calcium und Magnesium. [**The Antagonistic Heart Actions of Calcium and Magnesium**].—*Acta Brevia Neerlandica*. **1.** 23-24.

II. Seekles, L., Sjollema, B., & van der Kaay, F. (1932). Zur Pathogenese der Paresis puerperalis. [**On the Pathogenesis of Puerperal Paresis**].—*Ibid*. **2.** 200. 1 table. [1 ref.]

III. Seekles, L., Sjollema, B., & van der Kaay, F. (1932). Der Herz- und Lungeneffekt von intravenös zugeführtem Calcium in Beziehung zu der Konzentration und dem chemischen Zustand des Calciums im Blutserum, nach Versuchen an Rindern. [**The Effect upon Heart and Lungs of Intravenous Introduction of Calcium, in Relation to Concentration and to Chemical State of the Calcium in the Blood, as Ascertained by Experiments on Cattle**].—*Arch. wiss. prakt. Tierhlk*. **64.** 536-546. 1 fig., 5 tables. [15 foot-note refs.]

IV. van der Kooi, W. (1932). Medeelingen vit de praktijk. Techniek van de endoveneuze toediening van $CaCl_2$-oplossing bij het rund. [**Notes from Veterinary Practice. The Technique of Intravenous Introduction of Calcium Chloride in Cattle**].—*Tijdsch. Diergeneesk*. **59.** 565-567.

I. The antagonistic action of calcium and magnesium on the heart is discussed. For recommendations in regard to the use of solutions containing both calcium and magnesium chlorides see the authors' own review [this *Bulletin*. **3.** 201].

II. Describes paresis in a cow which developed milk fever at every calving for several years, and records total diffusable and ionized calcium in the blood, total and diffusible inorganic phosphate and total potassium, at intervals from the hour of parturition until recovery.

The noteworthy feature was that the ionized fraction of the calcium reflected the symptoms much more closely than the total calcium. The total dropped to 5·6 mg. per cent. 33 hours after calving, with 0·55 mg. ionized, rose to 8·6 mg. during paresis while the ionized portion remained at 0·52 mg. On then injecting 100 units of parathormone (" Lilly ") paresis disappeared in one and a half hours with sharp rise to 1·2 mg. (double) of ionized calcium but actual fall of total calcium to 8·1 mg.

The changes in potassium and inorganic phosphate are also discussed.

III. The vagotonic effect of injection of calcium salts on heart and respiration of cattle is described and a typical graph presented—in general a bradycardia lasting a few minutes up to half an hour with corresponding respiratory changes, with heart-block and cessation of respiration in extreme cases. So long as the calcium was ionizable there were no marked differences between inorganic and organic salts.

The ionized calcium injected was for the most part rapidly bound by the plasma proteins acting as protective buffer. In normal serum a quarter to one third of the total calcium was in ionized form, but of the increased calcium resulting from the injection more than half was undialysable shortly after the injection.

Within four hours of the injection the serum calcium returned to normal. The maximum cardiac effect occurred immediately after the injection when ionized calcium was highest.

IV. In cases of milk fever and grass tetany, the author recommends intravenous injection of calcium chloride into the mammary vein, with the cow in lying position, by means of an ordinary syringe, rubber tube and canula.—H. H. Green.

Sanell, M. (1931). Ång. behandlingen av puerperal hämoglobinämi hos ko.

[On the Treatment of Puerperal Haemoglobinaemia in Cattle].—*Svensk Vet.-tidskr.* **36.** 289-290.

Puerperal haemoglobinaemia in cattle occurs frequently in certain parts of Sweden, usually within a fortnight of delivery. According to the author, the mortality has previously been about 25 per cent. Thirty-four cases, most of which were seriously ill with a sub-normal temperature and a pulse up to 150, recovered quickly after being treated by blood transfusion.

The author recommends the transfusion of 4 litres of either defibrinated or citrated blood.—N. LAGERLÖF (STOCKHOLM).

TECHNIQUE.

I. WEATHERALL, Cicely. (1932). **Tubercle Bacilli in the Blood Stream in Human and Animal Tuberculosis.**—*Lancet.* **222.** 980-983. [10 refs.]

II. CUMINGS, J. N. (1932). **The Cultivation of the Tubercle Bacillus and the Occurrence of Tuberculous Bacillaemia.**—*Ibid.* 983-984. 2 tables. [12 refs.]

III. —. (1932). **Tubercle Bacilli in the Blood.**—*Ibid.* 999.

I. Using washed haemolysed stromata, on the principle of Löwenstein's technique, and culturing either in a synthetic fluid medium, on Dorset's egg medium, or on an egg medium enriched by glycerin veal broth, when applied to tuberculous guinea pigs, has not been successful. When 0·5 c.c. of heart blood from 63 tuberculous guinea pigs was cultured in veal broth by the method of Dreyer and Vollum, one primary positive culture was obtained and in two cases subcultures on egg medium were successful. The guinea pigs were infected by diverse strains and not from laboratory strains. One guinea pig inoculated with 8 c.c. of blood from an advanced case of pulmonary tuberculosis of two years standing, developed glandular and generalized tuberculosis. From 14 other patients negative results were obtained in guinea pigs.

II. A description is given of attempts to cultivate the tubercle bacillus from pathological materials on Cooper's potato medium and Hohn's egg medium. The egg medium yielded more than twice as many positive cultures as the potato medium and a positive culture was only obtained in about 50 per cent. of the cases in which the tubercle bacillus was demonstrated by direct examination or guinea pig inoculation.

Blood culture was performed in cases of tuberculosis, disseminated sclerosis and lymphadenoma, with negative results.

III. The cultivation of tubercle bacilli from the peripheral blood has been brought into prominence during the last two years by Professor E. LÖEWENSTEIN of Vienna. Various workers, including WEATHERALL and the author, have departed from the original technique in some details, such as the choice of media, therefore the results are not in absolute strictness comparable with those of LÖEWENSTEIN. They do, however, support the figures of other workers, in that they do not confirm LÖWENSTEIN'S results. Vienna has a high incidence of tuberculosis and we must not expect to reproduce LÖEWENSTEIN'S figures here. The question arises whether the culture media may be more sensitive than the older guinea pig test. The pitfalls here are the acid-fast bacilli of feeble virulence and of acid-fast saprophytes which may not be so uncommon as has been supposed.

—NORMAN DOBSON.

OFFICIAL REPORTS.

STRAITS SETTLEMENTS. (1932). **Annual Report of the Veterinary Department**

for the Year 1931. [SHEEDY, F. J.] pp. 10. Singapore : Government Printer. [fcp.]

The staff of the Veterinary Department included, besides the Chief Veterinary officer, who is also in charge of the Veterinary Department of the Federated Malay States, two British officers and ten Asiatic assistants in addition to clerical and other staff. The cost of the Veterinary Service is considered to be just over 1 per cent. of the estimated value of the livestock of the territory.

Animal census figures are given and show that, roughly, there are 18,000 cattle, 19,000 buffaloes, 24,000 sheep and goats, 106,000 pigs, 24,000 dogs and 480 horses in the Straits Settlements.

EPIZOOTIC DISEASES.—Rinderpest was observed only in a small consignment of slaughter cattle at a quarantine station at Singapore after arrival from Rangoon : it was suppressed without trouble. Foot and mouth disease broke out twice in a Singapore stockyard and was suppressed after 300 and 137 animals respectively had become infected. Swine fever gave some slight trouble during the year. The position with regard to rabies is discussed : the disease broke out in 1930 and continued into 1931, ten canine cases being diagnosed. The position is really very favourable considering the large unlicensed (pariah) dog population. Fowl cholera and *Bact. pullorum* infection are also briefly referred to.

" DRY COAT " is a common condition in race horses. Its relation to nutrition, particularly to qualitative deficiency is being studied.

ANIMAL HUSBANDRY.—A review of the animal husbandry position concludes the report. The territory, lacking good pasture land, is unsuited for stock raising and most of the food of animal origin required by the population is imported.

Hitherto it has been impossible to undertake any veterinary research, but there is hope that, in the near future, this will be included within the work of the department.—J. E.

FEDERATED MALAY STATES. (1932). **Annual Report of the Veterinary Department for the Year 1931.** [SHEEDY, F. J.] pp. 15. Singapore : Suppl. to *F.M.S. Govt. Gaz.*, June 17th. [8vo.]

There were seven European and 21 Asiatic veterinary surgeons on the staff during the year. The work is very similar to that of the neighbouring Straits Settlements and Mr. Sheedy is Chief Veterinary Officer of the Veterinary Departments of both territories. A joint conference between the Veterinary Departments of the two territories was held early in the year and there were discussions on quarantine methods, rabies, rinderpest, haemorrhagic septicaemia, animal husbandry and the recruitment of natives as junior members of the veterinary staff.

EPIZOOTIC DISEASES.—Rinderpest gave much trouble in Selangor State during the year and 17 separate local outbreaks were dealt with by segregation methods alone. A careful study of rinderpest in Malay buffaloes was made by Mr. WALLACE and a summary of his report is given. The disease in buffaloes showed certain marked differences from that of cattle. Three outbreaks of mild and non-fatal foot and mouth disease occurred. There were three cases of anthrax in cattle and one case of porcine tuberculosis. Sporadic cases of surra in dogs were found. Swine fever is more or less enzootic, but is of a mild type. Five cases of canine rabies occurred in Selangor State, but there was no general outbreak, although the presence of numerous pariah dogs is always a danger.

POULTRY DISEASES.—It has not yet been possible to do much work on poultry diseases, but the subject is receiving attention.

ANIMAL HUSBANDRY.—The position of animal husbandry is similar to that described in the review of the Straits Settlements report (above). There is a

considerable import trade and the quarantine service is consequently a very important branch of the department. The local indigenous stock is of very poor quality. Buffalo breeding, mainly for labour and transport purposes, has been given attention by the department (by Mr. MACGREGOR) and practical encouragement is now given.

HELMINTHOLOGICAL WORK.—Mr. G. B. PURVIS has contributed valuable helminthological work: apart from this no systematic research has yet been possible.—J. E.

BOOK REVIEWS.

HENRICSSON, E. [Veterinarian at the Swedish State Laboratory, Stockholm]. (1932). Epizootischer Abortus und Undulantfieber. Eine epizootilogisch-epidemiologische Studie. [**Epizootic Abortion and Undulant Fever. An Epizootic and Epidemiological Study**]. pp. 203. 32 figs., 28 tables. [114 refs.] Stockholm: Isaac Marcus Boktryckeri-Aktibolag. [In German].

Dr. Henricsson was entrusted early in 1928 with the study of the association between brucella infection in animals and man. It soon became clear that the prevention of undulant fever in Sweden was closely bound up with the control of brucella disease amongst cattle and this fact led him to a painstaking study of the means by which this disease was commonly spread. Much of the data for this portion of the work was obtained by an intensive study of a typical agricultural area (Rimbo) supporting about 45,000 cattle.

The work is presented, together with 114 references, under the following headings:—introduction, earlier views on epizootic abortion, its occurrence and spread in Sweden (maps and data being given from 1859 to 1930), bacteriological and serological diagnosis, the method of spread, undulant fever and its association with epizootic abortion and prophylaxis of epizootic abortion and undulant fever.

In view of the difference of opinion existing as regards the antibody titre which should be regarded as indicative of brucella infection, Dr. Henricsson made agglutination and complement-fixation tests with sera from animals in herds of various types using antigens prepared from bovine and human strains of *Br. abortus*. He was fortunate in having to hand an isolated district in Lapland 200 km. from the nearest infected area, in which the disease had never occurred, and in which the herds were small and self-contained. He concludes from an examination of sera from 21 animals in this district that, with a glycerinated carbol saline suspension containing 1·0 per cent. by volume of organisms killed by steaming for five minutes, agglutination with distinct deposit at 1 : 10, or agglutination without deposit but recognizable at 1 : 40 with a lens, must be considered as specific. From the results of tests with sera of various kinds he also concludes that it is of no importance whether the test strains are of bovine or human origin and that more marked reactions are obtained with a saline suspension containing 0·6 per cent. by volume of organisms killed with formol, in the case of sera from both uninfected and infected animals.

The chapter on spread is of interest in that the author has started *ab initio* and in many ways left the beaten track. The effect of seasonal changes, rainfall, temperature, and of the wetness of the ground were investigated without findings of particular note. In the district of Rimbo a detailed study was made and, as in the case of 66 per cent. of farms the method of infection could not be traced to the usually accepted agencies, a topographical survey was made. Maps are given showing the spread of infection year by year and its association with roads, railways, and with water courses or lakes in which the country abounds. The author comes to the conclusion that, both on the farm and between farms, brucella infection is

frequently spread by water and that due account must be taken of this avenue as well as of the more commonly accepted means of transmission. The evidence on which this is based appears to be the following. Of 602 isolated farms 1·3 per cent. were infected, of 279 near roads or railways 1·4 per cent. were infected, whereas for 117 near water courses or lakes only and 71 near water and roads or railways, the percentages were 15·4 and 36·6 respectively. Examination of the drinking supply of 56 infected and 30 clean herds, which mostly comes from local springs, showed that there was a striking relation between the character of the water, particularly as regards coliform content and other evidence of faecal contamination, and the presence of brucella infection on the farm.

Details are given of the epidemiology of undulant fever in Sweden, correlated with the extent of bovine infection (infection of other animals is practically non-existent); it is concluded that certain strains of brucella from cattle are of unusual pathogenicity for man.

The work contains much that is original and is well produced and illustrated.
—A. W. STABLEFORTH.

RANDOIN, Lucie., [Director of the Laboratory for Physiology and Nutrition at l'Ecole des Hautes Etudes and at l'Institut des Recherches Agronomiques]. & SIMONNET, H. [of the Department of Physiology, Alfort Veterinary College]. (1932). Les Vitamines. [**The Vitamins**]. pp. 220. 70 figs., 4 tables, 9 graphs. [13 refs.] Paris: Librairie Armand Colin. [Cr. 8vo.] [Fr. 10·50.]

This small book, divided into six chapters, surveys knowledge concerning vitamins so far as human beings and the usual experimental laboratory animals are concerned. There is no information, however, on the natural avitaminoses of farm and other domestic animals, beyond one or two very brief passing remarks.

Most of the references quoted are several years old and very little of the work of the last year or two is mentioned.—J. E.

WOLTER, F. [Dr. Med. Director of the Hamburg Research Institute for Epidemiology]. (1931). Bangsche Krankheit beim Menschen (Febris undulans Bang) und Mittelmeer-Malta-Fieber. [**Bang's Disease in Man and Mediterranean or Malta (Undulant) Fever**]. pp. 193. 1 table. [27 refs.] Leipzig: Curt Kabitzsch. [RM.6.]

The subject is discussed at some length from the epidemiological point of view, chapters being given to the relation of Bang's disease and Malta fever, the explanation of the first appearance of Bang's disease in man in the present period and its association with contagious abortion in cattle. Finally the results of these studies are compared with those of various other pairs of diseases including the "Haffkrankheit" of 1924 to 1926 and equine haemoglobinuria, and psittacosis and parrot disease of South America.

The author concludes that Bang's disease in man (febris undulans Bang) and Mediterranean or Malta fever belong to an epidemiological unit of the first order—in the sense in which this expression has previously been used, i.e. to denote a group of diseases whose genesis is bound up with soil and climate, and that this hypothesis is illustrated not only by their similarity in pathogenicity etc., but by their modification under the influence of soil and climate conditions. The author also discusses the probability of similar influences on diseases of a non-contagious or non-bacterial nature. The last chapter is given to the effect of these considerations on prophylaxis.—A. W. STABLEFORTH.